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Shipping Legislation

IN passing the Jones bill, providing virtually for continued government ownership of merchant shipping by preventing the sale of any government-owned tonnage except by unanimous consent of the Shipping Board and also providing for the improvement of government-owned shipping by replacements and new construction, the Senate has utterly disregarded the known sentiment of the country in favor of a privately owned merchant marine. What treatment the bill will receive in the House cannot be predicted, but if the House should pass the bill in its present form, a veto by the President is practically certain.

That the citizens of the United States are overwhelmingly in favor of the Government getting out of the shipping business has been demonstrated time and time again. They desire an adequate merchant marine but they want to see it developed under private ownership. The only way in which this can be accomplished is by the enactment of legislation which will enable private shipowners to meet the competition of foreign owners. Left to their own resources private shipowners are barred from foreign trade by the higher costs of building and operating ships under the American flag. The remedy is a matter of dollars and cents—a subsidy in fact, if not in form. Why, with every section of the country demanding a privately owned merchant marine, the Government should hesitate to provide the necessary aid for accomplishing this purpose is a mystery that only a politician can fathom.

Under present conditions the plight of American overseas shipping is rapidly becoming acute: to some of our foreign competitors it is merely a joke. The provisions of the Jones bill authorizing replacements and additions to the government fleet would tend to strengthen existing lines but the taxpayers expect and demand that money expended by the Government for overseas shipping shall be spent wisely and economically in the support of a going business enterprise capable of earning a profit and expanding under the initiative and resourcefulness of private management. Some of the bills introduced in this session of the Congress provide ways and means for the Government to absorb the excess costs of building ships in American yards and these measures would involve a far smaller expenditure of government money than would be required to build the same ships under government ownership. Ways and means are also provided in the same bills for meeting the excess costs of operation of American ships through mail contracts and payments for service in a naval reserve. It is only by the enactment of such measures that American shipping can succeed in foreign trade and such legislation should be enacted without delay.

Shipbuilding Prospects

IN STRIKING contrast to the gloomy outlook confronting American shipbuilders during the past year, when the volume of work in the shipyards was steadily decreasing and few new contracts were being awarded to take the place of finished work, the new year has brought a decided change for the better as far as the prospects for shipbuilding are concerned. In fact if present proposals materialize, as many of them undoubtedly will, there is every prospect of a revival of American shipbuilding which by the end of the year should provide sufficient work for the operation of existing shipyards at normal capacity.

This promising situation has been brought about by the requirements of the Navy Department for an extensive shipbuilding program and by various proposals for the construction of new merchant tonnage. The naval program recently presented to Congress provides for the construction of 71 vessels at a cost of ap-

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proximately $740,000,000. This program includes 25 light cruisers, 9 destroyer leaders, 32 submarines and 5 aircraft carriers. In considering this program the House Naval Affairs Committee has already decided that all of these vessels should be laid down in 5 years and completed in 8 years. Moreover it has been disclosed that these vessels represent only the beginning of a 20-year naval construction program which the Government will be asked to undertake in future.

As to merchant work, American shipyards had under construction at the beginning of the year approximately 150,000 gross tons of merchant vessels. In addition to this, various proposals are now under consideration, some of which have already reached the stage where bids either have been or are about to be asked, which will add over 100,000 gross tons of merchant vessel construction to the work already in hand. These proposals include tonnage not only for replacement purposes but also for the expansion of existing lines and the establishment of new services. These new vessels include seagoing passenger liners, tankers, colliers, ferry boats, yachts, tugs, car floats, lighters and other miscellaneous craft. In addition to this work, which is definitely planned, there is a considerable amount of conversion work which will materially increase shipbuilding activities during the year. The Shipping Board has recommended to Congress the expenditure of $12,000,000 for the reconditioning of the *Mount Vernon* and *Monticello* and this recommendation has received the approval of the House. The Shipping Board also plans the conversion of 10 cargo vessels into colliers and 6 freighters to pulverized coal burners in addition to the Diesel conversion program which is already under way.

Rear Admiral Plunkett

REAR ADMIRAL Charles Peshall Plunkett, U.S.N., will retire on February 15, when he will have reached the age limit of 64 years.

It is the rule, rather than the exception, that naught but good can be said of an officer of the Navy of the United States who reaches the rank of rear admiral or higher and is then honorably retired; but the record of Admiral Plunkett makes him stand out in bold relief as one of superlative degree.

To record the varied and colorful experiences of Admiral Plunkett from the three cruises he made in the old full rigged sailing ship *Constellation*, while at the Naval Academy, until now would fill many pages. Often they followed the same routine prescribed for every naval officer who rises to the rank of rear admiral —world wide service at sea combined with a certain amount of work on land; but the forceful character back of the act frequently made a difference in the result attained.

It is characteristic of Admiral Plunkett that he is a great believer in the doctrine ascribed to the Earl of Chesterfield, "whatever is worth doing at all, is worth doing well." It is reflected, for example, in his record as captain in command of the *North Dakota* in the fall of 1914, when the splendid achievement of the crew in elementary gunnery practice, "and that, too, with old guns of inferior caliber," according to the report of the Secretary of the Navy for 1916, resulted in his appointment in the latter part of 1915, as director of gunnery exercises and engineering. The outcome was, that the whole system of gunnery training of the United States Navy was completely reorganized. The same mind, the mind of a genius, that accomplished that feat is responsible for the development of the modern fire control systems now in use in the Navy.

In war, too, it was the same. It was Admiral Plunkett who organized and trained the personnel of the 14-inch naval railway batteries sent over to France and then commanded them in action. It is said of the Admiral that after reaching the other side and being told that the guns as mounted on the cars would not be permitted to cross a certain bridge because the rated capacity as recorded on a sign on the structure was less than the combined weight of gun and car, he promptly removed the sign and ordered the train to proceed. While the story is not true, nevertheless it will serve to illustrate the admiral's decisiveness.

For those achievements, Admiral Plunkett was awarded the navy Distinguished Service Medal, the citation reading:

"For exceptionally meritorious service in a duty of great responsibility as Director of Gunnery Exercises in connection with the training of Naval Personnel in gunnery in preparation for war. Also in connection with the development, organization and operation of the Fourteen Inch Naval Railway Batteries, which he commanded in land operations on the European Battle Front."

A lover of peace, Admiral Plunkett is a consistent advocate of preparedness as the best insurance against war; and since preparedness can be complete only if America is equipped with a merchant marine of ample proportions, the Admiral has never missed an opportunity to drive the fact home with that forceful emphasis which never fails to win applause from his numerous audiences. It is no wonder, then, that he has decreed that the testimonial dinner to him, a notice of which appears elsewhere in this issue, shall be transformed into a vehicle for furthering the interests of the American Merchant Marine.

The Mercer's First Voyage

NO RECENT development in marine engineering has attracted such widespread interest as the Shipping Board's experiments with the burning of pulverized coal in Scotch boilers and the subsequent installation of this equipment on the sea-going cargo steamer *Mercer*. That the *Mercer* should give a good account of herself on her first voyage across the Atlantic is not surprising to those who had an opportunity to examine this installation and study the preliminary trials of the vessel.

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This installation is simply a continuation of the experiments conducted on shore and on the first voyage no attempt was made to secure complete data covering its performance. The important point to be determined was whether pulverized coal could be depended upon to drive a typical steam vessel on an extended voyage at sea. This point the first voyage of the *Mercer* has conclusively proved; subsequent service will give an accurate measure of the efficiency and economy of this type of propulsion.

All things considered the first voyage of the *Mercer* was a remarkable one. Encountering heavy weather for most of the time on the outward trip, she averaged 9 knots and arrived at Rotterdam ahead of her schedule. On the homeward run she arrived 2 days ahead of time. In all of this time only 2 of her 3 boilers were used, and only minor difficulties were encountered all of which were overcome by the ship's crew. It is reported by the Shipping Board authorities that the results were well above 10 percent better than the performance of hand-fired, coal burning Shipping Board vessels and very much better from the point of view of fuel costs than is obtained with oil-fired steamers. It is estimated that a reduction of at least 15 percent in actual fuel costs was obtained, as compared with previous performances of the vessel as an oil-burner, and that later results will show the actual saving to be much greater.

The conditions under which this first installation was made were admittedly far from ideal and improvements in both pulverized coal equipment and methods of installation will naturally follow as experience and further experiments point the way. The results thus far obtained, however, have been so satisfactory that the Shipping Board fuel conservation committee, headed by Captain C. A. McAllister, who first brought the matter of pulverized coal to the attention of the committee, has recommended the conversion of 6 more Shipping Board vessels to pulverized coal burners, and numerous private shipowners are actively investigating the possibilities of using powdered coal on their vessels. From now on pulverized coal must be reckoned with as an important factor in the powering of ships.

The California

FOR MANY reasons the building of the *California,* described elsewhere in this issue, is an event of outstanding importance in the annals of American shipbuilding. Not only is she the largest passenger vessel ever built in the United States but she is also the first large merchant vessel in the world to be equipped with electric drive. She is also the first large ocean passenger liner to be especially designed for intercoastal service through the Panama Canal and in her appointments and interior decorations she reflects with exceptional fidelity the American Colonial period of architecture. With so many distinctive features incorporated in one design she marks an important step in the progress of naval architecture and marine engineering and her performance in service will be followed with the keenest interest by shipowners and builders throughout the world.

That intercoastal passenger traffic by water promises a profitable field for development is apparent from the plans of the International Mercantile Marine Company which has already ordered the construction of a duplicate of the *California* for this service and contemplates the building of a third vessel of the same type. In providing an adequate fleet of the highest class of vessels especially designed for this service the owners have added an important link to the American merchant marine in domestic service and deserve the unqualified support of the traveling public for their courage and vision in undertaking this important step. Needless to say the owners have left no stone unturned to provide in the new vessel the utmost in safety, comfort and convenience for their patrons. Nor will luxury-loving travelers be disappointed for every luxury is provided in surroundings that are marked by a quiet dignity and simplicity that is refreshing in contrast to the ornate and extravagantly embellished rooms on many modern liners. In view of the fact that the vessel's course is through tropical waters for much of the voyage special attention has been given to the provision of ample space, light and ventilation in all living quarters. Every first class room on the ship is an outside room and wide deck spaces provide an unusual amount of space for lounging and recreation. In this connection a novelty is introduced in the arrangement of outdoor swimming pools for both first class and tourist passengers.

The outstanding feature of the *California,* of course, is the use of electricity for propelling the ship and for driving most of the engine room and deck auxiliaries. The advantage of this which immediately impresses the passenger is the practically complete elimination of vibration and noise from the machinery in the ship. Only when the helm is put over is any vibration noticeable even in the tourist cabins aft over the propellers. With these conditions existing it is conceivable that the *California* will become one of the most popular liners afloat for sea travel. The fuel consumption is said to be 0.8 pound of oil per shaft horsepower hour. This figure, it is claimed by the General Electric Company, who supplied the machinery, could be improved by the use of one large main generator set in place of the two used on this vessel and by the use of higher steam pressures and superheat. In the second ship now under construction at Newport News it is understood that a higher pressure and superheat will be used.

It is interesting to note that the example set by the *California* is being followed abroad by the construction of an electrically driven passenger steamship

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of about the same size for the Peninsular and Oriental Steam Navigation Company but in this case a higher steam pressure and higher superheat are being used. Although the electric drive can hardly be looked upon as an experiment in view of its extensive adoption in the capital ships of the United States Navy and elsewhere, nevertheless the fact that the *California* is the first large ocean liner to be so equipped makes this installation an object of special interest to marine engineers. If the fact that this installation was made at no greater cost than would have been required for a straight geared turbine drive means that the difficulty of the high initial cost of electric propelling machinery has been overcome, it is not unlikely that electric propulsion will soon find a wider application in merchant vessels.

Four-Day Liners

WHEN the scheme of establishing a new steamship service to Europe with fast liners capable of crossing the Atlantic in four days was first talked about several months ago the idea was looked upon in most quarters as impractical and doomed to failure by reason of the tremendous costs involved in comparison with the earning power of the vessels. At that time it was proposed to build ten 30-knot liners, each about 700 feet long with a carrying capacity of 400 passengers, to provide daily sailings from both sides of the Atlantic. Since that time the scheme has been submitted to the scrutiny of competent committees composed of the foremost naval architects, marine engineers, shipping authorities and economists in the country with the result that radical changes have been made in both the design of the ships and the proposed schedule of operation. A company has been formed to operate the liners, private capital has been subscribed to the extent of some $50,000,000 and the whole plan has been submitted to the Government for approval and financial support.

Details of the proposal as outlined at a hearing before the Shipping Board on January 24 show that the new company plans to build six 35-knot combined airplane carriers and passenger liners of about 35,000 tons displacement to maintain a schedule of three sailings a week from each side of the Atlantic. Havre is designated as the European terminal with some point yet to be selected within easy reach of New York as the American terminal. The cost of the vessels is estimated as about $21,000,000 each, three-quarters of which the Government is asked to loan at the current rate of interest the government has to pay for its funds.

Insofar as the design of the proposed vessels is concerned there is nothing new or untried involved. It embodies the latest developments of sound engineering practice based on practical experience and exhaustive research. The hull is over 900 feet long, 90 feet beam and 69 feet depth with a freeboard of 45 feet forward. In accordance with the practice in recent naval airplane carriers the smokestacks and masts are located at one side leaving the top deck wholly unobstructed as a flying field for the landing and taking off of airplanes which are to be used for the landing of passengers and mail in advance of the landing of the ship. Propulsion is by four shafts each driven by four Parsons geared turbines supplied with steam at 400 pounds per square inch pressure and 252 degrees F. superheat by 16 oil-fired express water-tube boilers of a modified Yarrow design located in 4 firerooms. The maximum power for a speed of 35 knots is 160,000 shaft horsepower and the normal power for 33 knots is 136,000 shaft horsepower. In service only 14 boilers will be used, 2 being held in reserve for cleaning and overhauling. Scoops are provided as pumps for the condenser circulating water and the steam auxiliaries will be driven by turbines. Accommodations are provided for 800 passengers, a crew of 614 and 50 supernumeraries making a total of 1,464 persons on board. Twenty-four airplanes will be carried in peace time with provision for 100 airplanes in war time. There are 90,000 cubic feet of hold space for carrying mail and 125,000 cubic feet for express freight.

While there is no doubt that the building of such ships is entirely feasible from an engineering point of view their profitable operation on the scale proposed is problematical. The development of faster means of transportation for passengers, mail and express cargoes with commensurate or greater comfort and safety has always been supported by an increase in traffic. In spite of the fact that North Atlantic traffic has always been a seasonal business the fact that a swift uninterrupted service at competitive rates would be offered would naturally tend to increase the volume of business. The success of this enterprise however depends upon the attitude of the Government toward the request of the new company for a loan of $94,500,000 at a low rate of interest for the construction of the vessels and the revision of the ocean mail act to provide higher rates, under long term contracts, for the carrying of mails across the Atlantic at the proposed higher rate of speed.

The fact that the backers of this project are ready to risk $50,000,000 of their own money in the enterprise is convincing evidence that they will leave no stone unturned to insure its success. The government's loan would be secured by liens on the ships so that in event of failure the government would come into possession of the ships at three-fourths of their cost. Of greater importance to the government, however, is the value these ships would have as naval auxiliaries. In an emergency the government would have available 6 airplane carriers superior in speed, cruising radius and capacity to anything afloat, together with experienced crews trained in their operation, all of which would have been provided at no expense to the government for construction and maintenance. The proposal merits favorable consideration by the Congress.

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Admiral Plunkett to Be Guest of Honor at Testimonial Dinner

THE TESTIMONIAL dinner to be tendered to Rear Admiral Charles Peshall Plunkett, U.S.N., at the Waldorf-Astoria, New York City, on the evening of February 15 will be unique in that the commemoration will serve the useful purpose of forwarding a movement of national importance.

Those who are acquainted with Admiral Plunkett, or have heard him talk on the subject, know that he is one of America's staunchest advocates of a real merchant marine; and in his characteristically unselfish way he has proposed that his own interests be set aside in favor of a congress on this subject. To sponsor the dinner the following committee was formed: W. J. L. Banham, president, New York Board of Trade and Transportation; Major General R. L. Bullard, commander, New York Chapter, Military Order of the World War; Colonel W. A. Dawkins, past department commander, United Spanish War Veterans; William L. DeBost, president, Chamber of Commerce, State of New York; John Dowd, president, Maritime Association of the Port of New York; Major C. A. DuBois, secretary, Empire State Society, Sons of the American Revolution; Lucius R. Eastman, president, The Merchants Association of New York; J. E. Edgerton, president, National Association of Manufacturers of the United States of America; Major General H. E. Ely, commanding general, Second Corps Area, United States Army; James A. Farrell, president, United States Steel Corporation; Homer L. Ferguson, president, Society of Naval Architects and Marine Engineers, president, National Council American Shipbuilders; Captain W. J. Graham, director, United States Naval Reserve Officers Association of Third Naval District; William Green, president, American Federation of Labor; Colonel William Patton Griffith, chairman, Kings County Memorial and Executive Committee Grand Army of the Republic, Kings County; Major General J. G. Harbord, president, Radio Corporation of America; Major General W. N. Haskell, commanding general, National Guard State of New York; Ralph Jonas, president, Brooklyn Chamber of Commerce; Rear Admiral L. M. Josephthal, commanding officer, Naval Militia State of New York; L. F. Loree, chairman, Association of Eastern Railroad Presidents; Captain Frank Lyon, U.S.N., New York Navy Yard; Clarence H. Mackay, president, Postal Telegraph Cable Company; Captain C. A. McAllister, president, American Bureau of Shipping; William B. McCann, commander, New York County Council, Veterans of Foreign Wars of the United States; Captain Charles R. Morrison, chairman, special committee, New York Chapter No. 13, Sojourners' Club; Honorable Lewis Nixon; Henry Harmon Noble, registrar general, General Society War of 1812; Brigadier General P. E. Pierce, Standard Oil Company of N. J.; L. E. Pierson, chairman of the board, American Exchange Irving Trust Co., president, U. S. Chamber of Commerce; H. R. Reynolds, chef de gare, Voiture Locale No. 17, La Société des 40 Hommes et 8 Chevaux; Charles M. Schwab, chairman of board, Bethlehem Steel Corporation; Colonel E. A. Simmons, past commander, American Legion, Kings County, president, American Marine Association, president, Brooklyn Chapter Reserve Officers' Association of the U. S. A.; R. A. C. Smith; Major General C. P. Summerall, chief of staff, United States Army; William H. Todd, president, Todd Shipyards Corporation; Brigadier General Cornelius Vanderbilt; H. B. Walker, president, American Steamship Owners' Association; Brigadier General George A. Wingate, president, New York Society Military and Naval Officers World War; and J. Thomas Winn, commander, Kings County Council Veterans of Foreign Wars of the United States. The dinner committee consists of Captain C. A. McAllister, chairman; John Dowd; William H. Todd; H. B. Walker and T. J. Kain, secretary-treasurer. Colonel E. A. Simmons is chairman of the general committee.

Rear Admiral Charles P. Plunkett, U. S. N.

That all sides of the subject might be presented by men well qualified to speak, Secretary of the Navy Wilbur has been asked to present that phase which has to do with the necessity for a merchant marine as a vital part of our national defense program. William Green, president of the American Federation of Labor, will tell about the attitude of labor; while Louis J. Taber, master of the National Grange, will add the farmers' endorsement. Business and finance will be presented by C. W. Lonsdale, president of the Simonds-Shields-Lonsdale Grain Company of Kansas City, Mo., chairman of the advisory committee of the Transportation Department of the Chamber of Commerce of the United States. Their speeches will be broadcast

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over the blue network of station WJZ of the National Broadcasting Company.

Governor Moore of New Jersey, Major General Charles P. Summerall, chief of staff of the United States Army and Rear Admiral Bradley A. Fiske, U. S. N. (retired) will pay well deserved tribute to Admiral Plunkett and in his response Admiral Plunkett will have something of considerable moment to say.

The occasion for the dinner is the Admiral's sixty-fourth birthday, which falls on February 15 and on which day he will retire from the Navy.

Born in Washington, D. C., Admiral Plunkett was appointed a midshipman on October 3, 1879, graduating from the Naval Academy on June 4, 1884. Beyond that, he was promoted as follows: Ensign, July 1, 1886; Lieutenant (junior grade), November 5, 1895; Lieutenant (senior grade), November 15, 1898: Lieutenant Commander, June 1, 1904; Commander, July 1, 1908; Captain, April 27, 1912; temporary Rear Admiral, July 1, 1918, and permanent Rear Admiral April 9, 1919. He served with distinction in the war with Spain, in the Philippine insurrection and in the world war.

Shipping Bills Under Consideration

Resolutions adopted at Shipping Board hearing — Progress of legislation—Shipping Board appropriations

By Harold F. Lane

WASHINGTON, D. C.

DISCUSSION of merchant marine legislation has been actively under way in Washington for the past month. The Senate committee on commerce has reported out the bills introduced by Senator Jones, of Washington, and Willis, of Ohio, and a general symposium of views on the subject was elicited by a hearing held before the Shipping Board on January 10 following which resolutions were adopted endorsing the general principles and policies embodied in the Wood and Copeland bills, introduced in the House and the Senate, as tending to assure a successful, permanent American merchant marine under private ownership.

After a general exchange of views on January 10 a committee was appointed, consisting of representatives of shipowners on the Atlantic, the Gulf, the Pacific coast and the Great Lakes, a representative of the shipbuilding industry and representatives of other groups interested in overseas transportation, to meet with representatives of the board and consider various proposals for the further development of the merchant marine under private enterprise. The committee was asked to develop concrete recommendations for legislation on which all those interested in shipping could unite. As a result the committee on the following day announced the adoption of the following:

Majority Resolution

Whereas, representatives of American steamship and trade associations and allied interests, in conference with officials of the United States Shipping Board, at Washington, D. C., this 11th day of January, 1928, desire to place on record the following brief analysis of conditions at present surrounding the American merchant marine.

We deem it to be an axiomatic truth, evidenced by executive pronouncements, acts of Congress and otherwise, that the people of the United States are desirous of possessing a merchant marine fully able to handle the greater portion of the country's water-borne commerce and also to serve as a naval auxiliary in time of national peril.

In order to appraise the present shipping situation, it becomes necessary to consider the existing merchant fleet under its two grand divisions: first, that part engaged in the purely domestic coastwise and intercoastal trades; second, the overseas or strictly foreign services.

The coastwise and intercoastal trades are restricted by law to vessels built in the United States and owned and operated by citizens thereof. This being an exclusively American industry, protected from foreign competition by our beneficent coastwise laws, it shares in the general prosperity of the country and constitutes one of the largest and finest shipping services in the world.

In a different status is the overseas fleet, organized largely since the war and operated with war-built ships, most of them under the control of the Shipping Board. Exposed to competition with faster and more modern vessels launched during the past few years by our foreign shipping rivals, this portion of the American merchant marine operates at a great disadvantage when compared with the coastwise fleet. Practically all American vessels engaged in foreign trade were designed before the advent of the fast modern "motorship," whereas the freight and passenger vessels which are being turned out so rapidly from the English, German, Italian, French, Scandinavian and Japanese yards constitute the new and speedier type. It is well to note that fully 50 percent of the vessels now under construction throughout the world are motorships. This of course means that unless present conditions are changed American ships will handle a constantly decreasing share of our vast overseas trade and will lose all hope of securing the profitable freight and passenger business.

The original theory underlying our recent national shipping operations was that the Government should use its war-built merchantmen in establishing steamship service on routes essential to American commerce, and should then dispose of these services to private American capital. The advent of the motorship, coupled with differentials in operating costs, due in great measure to different standards of living, has tended to make the purchase of the Government's lines so unattractive from an investment standpoint that of the 35 lines established by the Shipping Board only 10 have been sold. Although efforts are being made to remove some of the existing handicaps by converting a number of the Government's vessels into motorships, the process is a slow and costly one and thus far has been applied to only a few ships. The net results of these operations may be summed up by saying that while the converted vessels show a gratifying decrease in operating costs, the gain in speed is negligible and in no sense offsets the fast service furnished by our foreign competitors with new ships of modern type designed for specific trade routes.

The present situation admits of no misinterpretation. Our overseas merchant fleet is being rendered obsolete by the rapid march of science and invention, which has completely revolutionized the manner of vessel propulsion since our ships were built. In the absence of a replacement and reconditioning program, early transfer of a substantial part of the remaining ships to private ownership, with reasonable assurance of continued operation, is unlikely.

In these circumstances but two alternatives present themselves. One is to modernize the fleet. The other is to retire from the seas. The most vital national interests are involved, to say nothing of an annual ocean freight bill exceeding $700,000,000.

We believe that the Shipping Board, in the face of serious obstacles, has done its best to carry out the Merchant Marine Act of 1920. But we further believe that a crisis has been reached and that the future of the American merchant marine now depends upon prompt constructive action by Congress. This action should look toward reconditioning some of the present fleet and should otherwise provide inducements having in view its early transfer to private ownership under conditions assuring continuance of operation. Whatever Congress may do

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along this line will be unavailing unless it provides a way by which private American citizens will be enabled to own and operate modern ships in the ocean carrying trade of the world in competition with citizens of the other great maritime nations.

Now, Therefore, with due regard to the exigencies of the shipping situation as above set forth, be it

Resolved, that this conference endorses the general principles and policies embodied in the bills at present pending in Congress known as the Wood bill (H.R. 2) and the Copeland bill (S. 2036); and

Resolved further, that we recommend that the principles and policies contained in the main provisions of the above-mentioned bills be enacted into law, and to that end, that the United States Shipping Board furnish such information to Congress and make such reasonable effort to procure amendments and modifications as may be necessary to provide such adequate aid as will assure the United States having a successful, permanent American merchant marine under private ownership; and

Further Resolved, that we recommend that the United States Shipping Board lay before Congress full information concerning the character and number of new ships which in its judgment should be constructed in American shipyards to modernize the services now operated by the board.

Minority Resolution

The following was also reported by a minority consisting of Malcolm Stewart, N. O. Pedrick and W. F. Yates:

Resolved. that we recommend that the principles and policies contained in the main provisions of the Wood bill and the Copeland bill be consolidated in a composite bill and be enacted into law and that the United States Shipping Board procure such amendments and modifications as may be necessary, including the change of the Jones bill so that sales of vessels therein referred to might be made upon the concurrence of five commissioners, and also that Section 4 of the bill have a proviso that it shall be suspended for a period of one year from the date of the enactment of the composite legislation contained in all three bills mentioned above, with a view of ascertaining to what extent citizens might build vessels under the provisions of the Wood bill, and contemplating that, if private capital furnish necessary replacements to the American merchant marine, no building under the Jones bill would then be necessary, and provided that nothing in the Jones bill shall be construed as a commitment to permanent government operation and ownership, and provided further that Section 4 of the Jones bill be amended so as to read after the word required "to replace vessels in operation on the trade routes being maintained by the Shipping Board."

The following comment of the report of the committee was authorized by Laurence R. Wilder:

"Divergent counsel enough has been given to the problem of our merchant marine. Individual and sectional interests of course exist but I assume that we all want to bring back the sea supremacy on trade routes which the United States once had. If that is what we really want, we will not stand out for our individual predilections.

"We favor a compromise between private and public operation of our merchant shipping. We believe that the bills now in committee or before Congress can be welded into one to provide a solution satisfactory to all.

"Successful merchant ship operation must be achieved through private hands, as President Coolidge has stated. We want to see private capital and private initiative engage in our shipping to the widest possible extent. But there are lines which by their nature are not suitable for private operation but which must be maintained somehow because they are essential to our national prosperity. The government should continue to provide for our essential trade routes until they can be transferred to private hands or until private operators establish adequate substitute services."

Members of the Committee

The committee was made up as follows:

Representing the board; George Parson, director of the Bureau of Operations, John Nicholson, director of the Bureau of Traffic, and Alfred H. Haag, director of the Bureau of Research. For shipowning interests on the Atlantic Coast: H. B. Walker, president of the Steamship Owners Association, Ira A. Campbell, general counsel for that Association, E. M. Bull, president of the Bull Lines and Edwin H. Duff, Washington representative of the Steamship Owners' Association. Representatives of shipowning associations on the Pacific Coast: R. Stanley Dollar, of the Dollar Lines, Captain Walter Petersen of the Shipowners Association of the Pacific Coast, J. H. MacLafferty, vice-president of that association and Ira Lillick, representing the Pacific American Steamship Owners' Association. Great Lake interests: F. L. Leckie, of the Detroit & Cleveland Navigation Company. Independent steamship owners: Henry Hebermann, president of the Export Steamship Corporation. The National Counsel of Shipbuilders: C. L. Bardo, of the American Brown Boveri Electric Corporation, H. C. Hunter, general counsel for the counsel, H. G. Smith, of the Bethlehem Shipbuilding Corporation, and James Barnes, of the Todd Shipbuilding and Dry Dock Company. Maritime Association of the Port of New York: Emmet McCormack; Merchants Association of New York, William H. Knox. William F. Yates of the Marine Engineers' Association, represented labor, Malcolm Stewart, chairman of the Middle West Foreign Trade Association represented Middle West interests, and Norman F. Titus of the Transportation Division of the Bureau of Foreign and Domestic Commerce represented the Department of Commerce. The committee went into executive season immediately after the adjournment of the hearings.

Speakers at the Hearing

The hearings had been called by the Shipping Board for the purpose of discussing present problems of American shipping. A number of papers were presented and there were also several brief addresses by members of Congress, including Senator Royal S. Copeland of New York, and another by Governor Brewster of Maine.

The addresses and discussions dealt with practically all phases of the American shipping situation. In a number of cases recommendations of plans for hastening the process of transferring American shipping to private capital and providing for replacements were presented. Some of these corresponded closely in substance with measures dealing with shipping now pending in Congress.

The members of Congress present, each of whom spoke briefly, were the members of the sub-committee of the House Appropriations Committee, which deals with the Appropriation bill which provides funds for the Shipping Board. They were Representatives Wood of Indiana, Wason of New Hampshire, Summers of Washington and Cullen of New York.

The speakers were as follows: H. B. Walker, president American Steamship Owners' Association; James H. MacLafferty, vice-president Pacific American Steamship Association, George A. Marr, secretary Lake Carriers' Association, Cleveland; F. L. Leckie of the Inland Water Lines Association, Detroit; Emmet J. McCormack of the Maritime Exchange of New York; William H. Knox of the Merchants Association of New York; Malcolm Stewart, chairman, Middle West Foreign Trade Committee, Cincinnati; Henry Herbermann, president, Export Steamship Company, New York, and Lawrence R. Wilder, American Brown Boveri Electric Corporation, New York.

Shipping Bills

Senator Jones' bill, S. 744, providing for continued government operation of a merchant fleet and authorizing appropriations for the construction of additional cargo and passenger ships for replacement was favorably reported to the Senate on January 9 from the committee on commerce, with an amendment providing that the Shipping Board shall not sell any vessel or line of vessels except when in its judgment the building up and maintenance of an adequate merchant marine can be best served thereby, and then only upon the affirma-

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tive unanimous vote of the members of the board. On January 16 the Senate by a vote of 61 to 20 voted to make the bill unfinished business. On January 18 the committee agreed to a further amendment of the bill eliminating part of the first paragraph declaring that "the purpose of the United States to maintain permanently a merchant marine adequate for the proper growth of the foreign and domestic commerce of the United States and for the national defense is hereby reaffirmed." This would make the paragraph read: "That the policies declared in section 1 of the Merchant Marine Act, 1920, are hereby reaffirmed."

The report of the committe said in part:

We are at the parting of the ways on our merchant marine problem. Our merchant ships are getting old and out of date. No steps are being taken for replacement. The amount of our overseas commerce carried in ships under our flag is slowly but surely decreasing. Unless something is done at this session of Congress to bring about replacements, the building of up-to-date ships, and an assurance of permanent service, we will find ourselves in the position we were in at the breaking out of the World War, dependent upon foreign ships to get our goods to and from the world's markets.

It is said that the presence and operation of Government shipping prevents the building up of an American merchant marine. For 50 years before the World War we had no Government merchant ships, and, yet, our merchant marine did not build up.

We are told that if we will repeal the hampering restrictions of the La Follette Seamen's Act we will build up a merchant marine in private hands. We did not do so when we had no La Follette Seamen's Act, and that act will not be repealed.

They tell us that our complex and antiquated navigation laws prevent the building up of a privately owned merchant marine and, yet, a commission of practical shipping men was appointed a few years ago to study these laws and recommend changes deemed necessary and desirable. After a full and careful study, that commission recommended few and only minor changes.

It is urged that if we will provide Government aid to put our shipowners and operators upon an equal basis with their foreign competitors they will hold their own in competition with the world and give us an adequate merchant marine. Probably that is true, but in the judgment of the committee Congress will not do that. It means a substantial subsidy no matter what else one may call it nor the form that it may take. The committee is convinced that no subsidy bill can pass Congress no matter what our individual views may be about it. Even if we should pass a subsidy bill it might not be sufficient to induce the building and operation of ships by private capital and we will have accomplished nothing. There is also this phase of the subsidy theory that is too often overlooked. Suppose we grant a subsidy, our competitors will meet it with a higher one. They can and will act promptly. We can not meet their action except after years of deliberation and political controversy, if at all.

Unless a definite and constructive policy is adopted at this session nothing can be done for at least two years, but then our ships will be hopelessly deteriorated and helpless to meet world shipping competition. There seems to be no way by which we can get an American merchant marine privately owned. The only other recourse is a merchant marine constructed and owned by the Government. Concede for the sake of the argument all the objections that may be urged to the Government conducting the shipping business, we must choose between a Government merchant marine or no merchant marine at all.

Under these circumstances the committee has not hesitated to recommend the adoption of a policy looking to the construction by the Government of such ships as may be necessary to maintain the shipping services now under operation and such others as the needs of our commerce and our national security may require.

The report upon Senate bill 5792 at the close of the last session of the Sixty-ninth Congress is hereby made a part of this report.

The Jones bill is contrary to the expressed wishes of President Coolidge and at the White House on January 10 doubt was expressed in behalf of the President as to whether it would be expedient to require the unanimous agreement of the Shipping Board for the sale of ships, because that would mean that one member of the board could control. The President is not in favor of the government building any more ships at the present time.

Willis Bill Favorably Reported

On January 12 the committee also voted a favorable report without amendment on S. 789, introduced by Senator Willis, of Ohio, to amend the merchant marine act, 1920, approved June 5, 1920, by insuring the exemption from income taxes during the 10-year period there provided of profits on the sale of certain vessels when the proceeds of such sales are invested in new American vessels approved by the Shipping Board. "The necessity for this legislation," the committee report said, "grows out of a decision by the Internal Revenue Bureau regarding the effect of certain provisions in the merchant marine act of 1920. Section 23 of that act provided, among other things, that during the period of 10 years from the enactment of the law any citizen of the United States who might sell a vessel documented under the laws of the United States and built prior to January 1, 1924, should be exempt from all income tax that would be payable upon the proceeds of such sale under title 1, title 2, and title 3 of the revenue act of 1918, if the entire proceeds of such sale should be invested in the building of new ships in American shipyards; such ships to be documented under the laws of the United States and to be of type approved by the Shipping Board.

"It will be observed by the terms above quoted, the exemption was applicable only to income tax payable under the revenue act of 1918. This act was repealed and succeeded by the revenue act of 1921. The Internal Revenue Bureau holds that, since the tax from which exemption was given disappeared by that name with the repeal of the 1918 act, there is no exemption as to these funds under subsequent acts.

"As a result, American citizens who have sold ships and reinvested the proceeds in new ships with the idea that the original act gave them 10 years within which to make the reinvestment are now called upon by the present ruling to pay a substantial part of the proceeds of these sales as taxes.

"The clear, unmistakable purpose of Congress in enacting the original law was to give for a period of 10 years the advantage which would come from the aforesaid exemption. The purpose of the pending measure is to carry into effect this original purpose set forth in the merchant marine act of 1920.

"It is of the greatest importance that our shipping should receive all reasonable and proper encouragement. In spite of all that has been done, the proportion of our commerce carried in American ships is falling off day by day. It is, therefore, provided, that the advantages accruing under the original act shall exist, not only under the revenue act of 1918, but under any subsequent revenue act in force during the 10-year period beginning June 5, 1920."

Fletcher Resolution

Senator Fletcher, of Florida, on January 18 introduced Senate Joint Resolution 77, directing the Shipping Board to make no sales of lines or services, now being operated by it, pending the enactment of further merchant marine legislation by Congress. The resolution provides, however, that if five members of the board are convinced that any line or service can be sold with a reasonable expectation that a private company can and will permanently maintain it, such line or service may be sold under a contract binding the purchaser to main-

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tain the line or service for a period of not less than ten years and with a suitable provision obligating the purchaser to provide for replacements to efficiently maintain the line or service so sold, and provided further that no sale shall be made that tends to create a monopoly in American shipping.

In introducing the resolution Senator Fletcher said that he did so because he had been informed that negotiations are being carried on looking toward the sale of Shipping Board vessels on the Pacific coast and that there had been intimations that similar attempts were to be made respecting vessels operating on the Atlantic.

The Wainwright Bill

Representative Wainwright, of New York, has introduced H. R. 8914, authorizing and directing the Shipping Board to offer for sale the United States Lines, the contract of sale to require the purchaser or purchasers to construct two high-class passenger and cargo vessels, with the aid of a loan of $30,000,000 from the construction loan fund at 2 percent. If the board cannot dispose of the lines within six months, the bill provides that it shall construct two ships at a cost of not in excess of $15,000,000 each, the money to be taken from the loan fund. Provision also is made for special mail contracts and payments thereunder.

Senator Copeland has introduced S. 2036, a revision of a bill previously introduced by him providing for a mail subvention to aid the merchant marine. He also introduced S. 2037, embodying provisions of the bill previously introduced by Representative Wood as H. R. 2.

Appropriations for Shipping Board

An appropriation of $12,288,750 for the Shipping Board and the Merchant Fleet Corporation for the fiscal year 1929 was recommended by the House appropriations committee in its report, submitted on January 17, on the independent offices bill. This compares with $12,290,000 for the present fiscal year and with $13,688,750 estimated by the Budget Bureau. The recommended appropriation for the board itself is $288,750, and to provide for operating losses incurred by the fleet corporation the committee recommended $12,000,000, or $1,400,000 less than the Budget estimate, on the ground that certain economies might be effected through reductions in fuel and supply costs and the sale of several lines of vessels. In addition the committee deducted $350,000 representing the annual earned interest on various funds.

A new paragraph is recommended by the committee relating to the reconditioning of the steamships *Mount Vernon* and *Monticello* (formerly *Agamemnon*), which is as follows:

For the reconditioning of the steamships *Mount Vernon* and *Monticello* at a total cost not in excess of $12,000,000, not to exceed $10,000,000 is made available from the construction loan fund and shall be reimbursed to such fund with interest at such rate and within such period as the board may determine but not exceeding 10 years after the date of commission of such reconditioned vessels.

"These vessels have been very carefully surveyed," the committee report says, "and the cost of complete reconditioning and installation of geared turbines and watertube boilers, enabling them to maintain a speed of 20 knots is estimated at $12,000,000. The committee believes that if more than $10,000,000 is necessary, which sum is authorized by the paragraph just above set forth, it can be obtained from other funds at the disposition of the fleet corporation. Very careful estimates indicate that each vessel would earn approximately $400,000 per annum after reconditioning, and in addition would provide the United States Lines with a more balanced fleet, enabling the establishment of a weekly sailing service to European ports.

Naval Program

Secretary Wilbur and other officers of the Navy testified before the House committee on naval affairs on January 14 and succeeding days regarding the bill, H. R. 7359, to authorize the construction over a period of eight years of 25 light cruisers, 9 destroyer leaders, 32 submarines and 5 aircraft carriers, at an approximate total cost of $740,000,000 to be spread over five years of appropriations. Secretary Wilbur told the committee that such a program is in no sense competitive but is based on the needs of the Navy as determined by the Secretary on the technical advice of the general board of the Navy. He said that if this program is carried out and supplemented by a continuous building and replacement program designed to spread the cost of such construction uniformly over a period of 20 years and if this building is systematically and continuously kept up in the future, the danger of war will be greatly minimized if not entirely met.

Secretary Wilbur also outlined in his statement a 20-year construction and replacement program prepared by the general board involving an average expenditure of approximately $129,000,000 a year, with the objective of giving the United States a "first-class navy," but he said it would be undesirable to set definite dates for beginning the construction of vessels, saying that Congress "would regulate the time of building ships."

Assistant Secretary Robinson later told the committee that if the bill is passed the department intended to ask immediately afterward for $55,000,000 for the first year's appropriation.

Admiral Charles F. Hughes, chief of naval operations, in supplementing Secretary Wilbur's statement, invited particular attention to "a very important phase of the proposed continuous building program," saying that the United States shipbuilding industry, which is "an integral and essential part of our national defense," is gradually disappearing for lack of work. "In the absence of steady employment on naval construction," he said, "the most competent in the art are scattered to other employments. A naval building program, such as proposed, will conserve the shipbuilding industry, which is a strong factor in our national defense."

U. S. airplane carrier Saratoga

Reproduction of a painting made for a General Electric calendar by Walter L. Greene.

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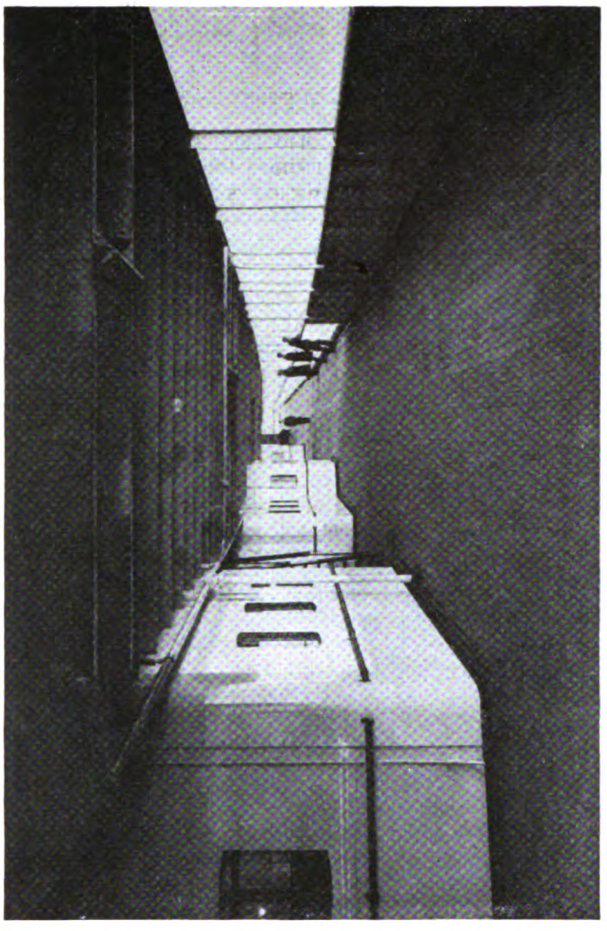
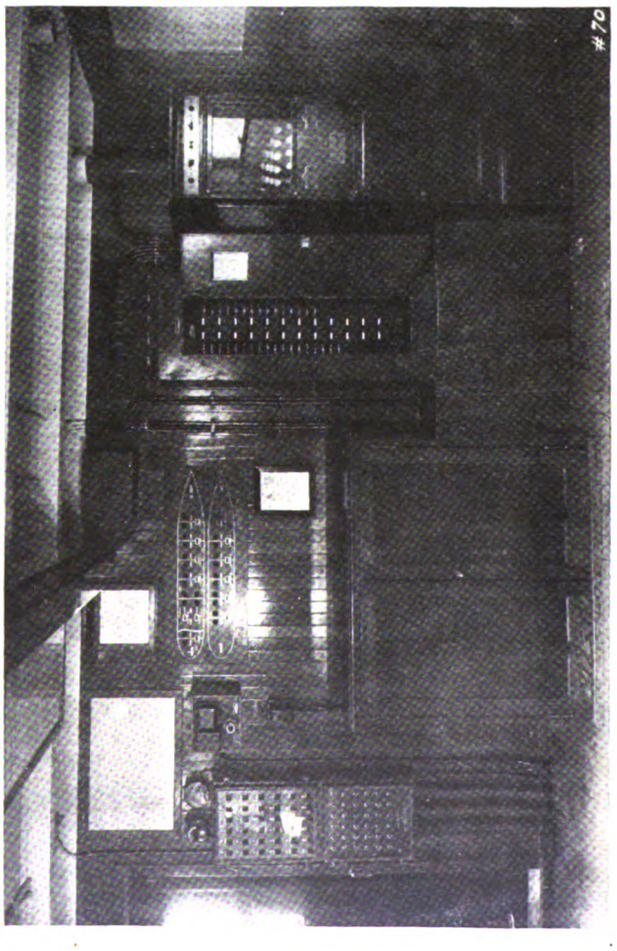


Promenade deck

Pilot house

Engine room ventilating fans



Looking aft in wheel house

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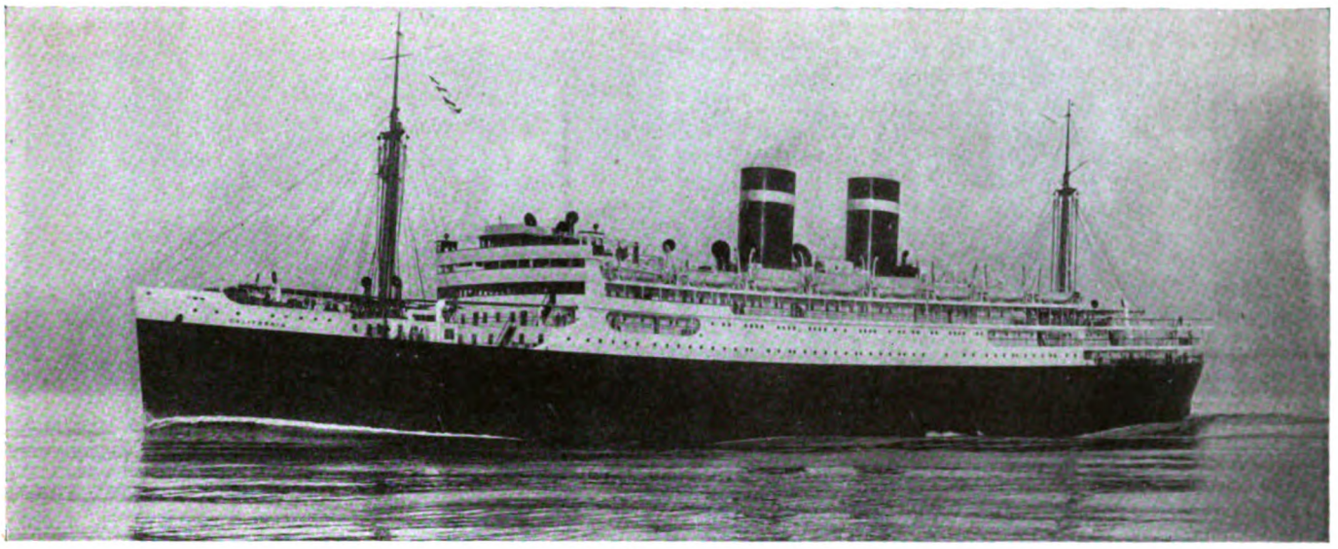

Turbo-electric passenger liner California

The Passenger Steamship California

The first large passenger liner to be propelled by turbo-electric drive

THE twin screw steamship *California,* which has been completed by the Newport News Shipbuilding and Dry Dock Company, Newport News, Va., for the Panama Pacific Line service of the International Mercantile Marine Company, New York, sailed from New York on January 28 on her maiden voyage to San Francisco. In type the *California* is unique among the vessels engaged in intercoastal service, since she is the first steamship of transatlantic type to be built especially for service through the Panama Canal. Details of the type have been modified to meet the requirements of voyages that are largely through tropical waters; but to all intents and purposes the new ship is an ocean liner of the highest class, in every feature of construction and equipment, and the first of her kind to be designated expressly for the run between New York, San Francisco and intermediate ports.

Not only is the *California* the largest passenger ship ever built in this country but she is also the first large commercial vessel to be propelled by the turbo-electric drive developed by the General Electric Company and used in the latest battleships of the United States Navy. The *California* was launched on October 1, 1927; her dock trials were held on December 17, her trial trip was run off the Virginia capes on January 7, 1928, and she was delivered to her owners on January 15.

Stair lobby

Lounge lobby

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The keel of a sister ship, which will be practically a duplicate of the *California* and which is scheduled for delivery on April 2, 1929, was laid at the yards of the Newport News Shipbuilding and Dry Dock Company in November, 1927. The second ship will have 10 additional tourist rooms and a different boiler arrangement, 8 large boilers with inter-deck superheaters taking the place of 12 smaller ones in the first ship. The construction of a third ship for this run is contemplated by the International Mercantile Marine Company but plans for this vessel will not be completed until the performance of the *California* in service has been analyzed.

Main Particulars

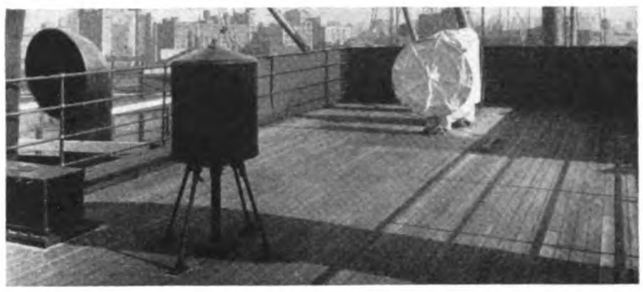
The general dimensions of the *California* are as follows:

Length overall	601 feet 3 inches
Length on waterline	595 feet
Length between perpendiculars	574 feet
Beam, molded, extreme	80 feet
Beam, molded, at promenade deck	77 feet
Depth, molded to shelter deck, at side	52 feet
Depth, molded to upper deck, at side	42 feet 6 inches
Load draft, to bottom of bar keel	32 feet 3 inches
Camber of all decks, in 80 feet	6 inches
Displacement at load draft	30,250 tons
Deadweight capacity at load draft	15,300 tons
Gross tonnage, about	21,000 tons
Shaft horsepower, maximum	17,000
Shaft horsepower at cruising speed	13,500
Designed speed	18 knots
Cruising speed	16.5 knots
Cruising radius	15,400 miles
Cargo capacity	478,700 cubic feet
Refrigerated cargo capacity	100,000 cubic feet
Fuel capacity	5,349 tons
First class passengers	384
Tourist passengers	363
Crew	350

The vessel is designed for passenger and freight service and is classed by the American Bureau of Shipping, to their highest rating, class A1 E, and has been built under special survey and assigned a freeboard. The construction and equipment are also in accordance with the Rules of the United States Steamboat Inspection Service and the Public Health Service. Subdivision of the hull is in accordance with the 1914 International Convention for the Safety of Life at Sea, and is such that the ship will float safely at 32 feet 3 inches mean initial draft with any two compartments opened to the sea by accident, the fore end of the hull being subdivided so as to allow the three foremost compartments to be flooded with safety.

The *California* will register about 21,000 tons gross, with a displacement of 30,250 tons at a mean salt water draft of 32 feet 3 inches to the bottom of the bar keel. At the above draft, the vessel, in service condition, will carry a total deadweight of about 15,300 tons, consisting of cargo, fuel, reserve feed water, drinking water, stores, passengers, baggage, crew and effects. The maximum cargo deadweight is about 7,800 tons. The gross cubic capacity of the cargo holds is 478,700 cubic feet, exclusive of the refrigerated spaces, which include 62,000 cubic feet for the carriage of California fresh fruit, 35,000 cubic feet for frozen cargo, and 15,000 cubic feet for ship's stores. Provision has been made for the shipment of passengers' automobiles through extra large side ports, no hoisting being required, with regular garage space for 100 cars and reserve hold capacity for 40 more. The service speed of 18 knots will cut two days from the owners' present schedule of 15 days between New York and San Francisco.

Accommodations have been provided for a passenger list of 747, including 384 first class and 363 tourist class,



Top of wheel house, showing radio compass loop housing at left

in addition to 350 officers and crew. There are eight decks, designated from the top down, as follows: Boat deck, promenade or "A" deck, bridge or "B" deck, shelter or "C" deck, upper or "D" deck, main or "E" deck, lower or "F" deck and orlop or "G" deck. First class passengers are berthed on the bridge, shelter and upper decks, amidships, and the tourist class accommodations are on the shelter, upper and main decks aft.

Hull Construction

The hull is of steel, transversely framed, with raking stem and a cruiser stern. There are two large stacks, the after one being a dummy used for ventilation of the machinery space, and two steel masts, with a height of 175 feet above the keel, necessitating the fitting of telescoping steel topmasts to permit of passing under the Brooklyn bridge. Both masts are equipped with tubular steel cargo booms of 10-ton and 3-ton capacity.

The hull is subdivided by 11 transverse watertight steel bulkheads, all extending to the shelter deck except 3 amidships which extend to the upper deck. Additional protection against flooding is provided by a cellular

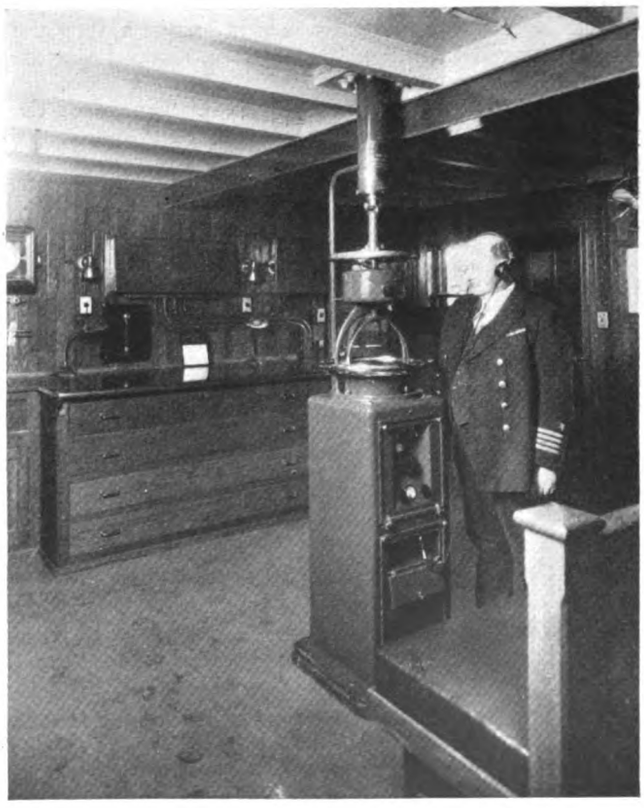


Chart room, showing Captain Candy operating radio compass

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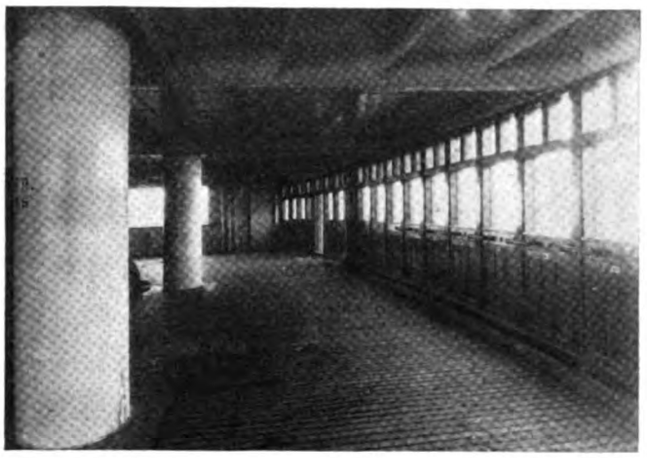
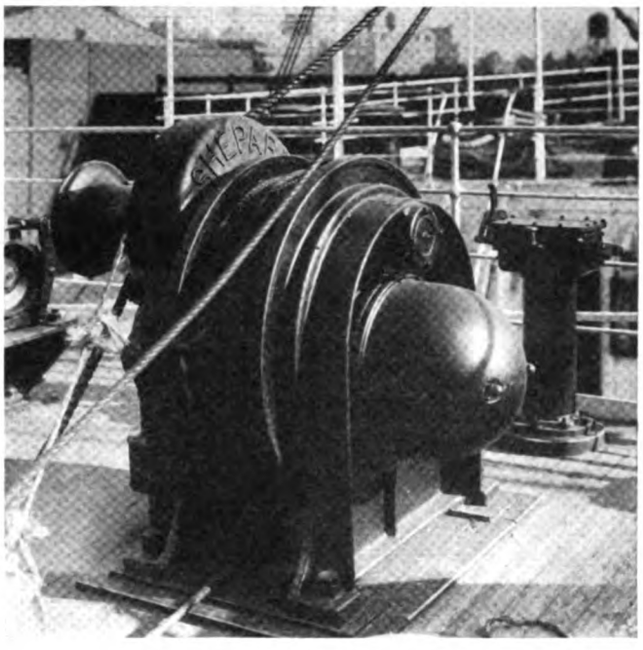


Forward end of promenade deck, showing storm windows

double bottom for the full length between peak bulkheads and this protection is carried up to the main deck by wing tanks abreast of the boilers, and to the orlop deck by similar tanks aft of the engine room. The double bottom and wing tanks forward, as well as a large deep tank forward of the boilers, are used for fuel oil storage, with reserve feed and culinary water in the after tanks. The forward double bottom and peak tanks are also arranged to carry salt water ballast, as may be required to trim the ship on an even keel in a partially loaded condition.

The shelter deck is the strength deck throughout, and all decks are completely plated except the boat deck, which is plated only in way of passenger and crew accommodations, the remainder of the deck having steel beams and stringers. A calked wood deck of 3-inch Oregon pine is laid outside the deck houses on the bridge, promenade and boat decks, navigating bridge and tops of houses, and a similar deck 3½ inches thick is laid on the shelter deck in the forward well. The decks are supported by continuous plate and angle girders carried on 3 rows of tubular steel pillars.

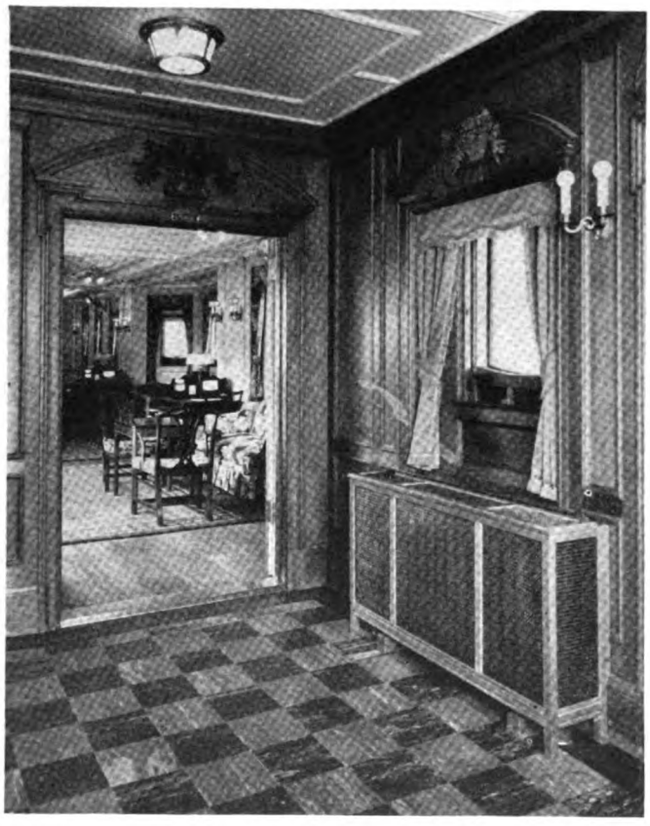
Comfort and safety have been added by fitting bilge keels for a length of 222 feet amidships to reduce rolling in heavy weather, and by extending three light steel fire screen bulkheads, with hinged fire doors, completely across each of the passenger decks, to prevent the spread of fire. The vessel is steered by a balanced cast steel rudder of ample size for safely handling the ship at slow speed in the Panama Canal. The effective area of



Shepard electric cargo winch

the rudder is 394 square feet. With its stock, which is the largest ever forged for an American-built merchant vessel, the rudder weighs 45 tons. The rudder post is of steel, 23 inches in diameter; the pintles are each 13½ inches in diameter.

The anchor chain cables are of cast steel, made by the National Malleable and Steel Castings Company. They are of 3⅛-inch wire diameter and have a total length of 335 fathoms. This chain is proof tested to 534,060 pounds or 50 percent more than the proof load specified for forged chain of the same size.



Entrance to lounge

Passenger Accommodations

With the exception of the main entrance lobby and the dining saloon, which are located on the upper deck forward, all of the first class public spaces, including the lounge, library, smoking room and deck veranda, are on the promenade deck. The main promenade extends completely around the promenade deck. The deck chairs for the promenade space were manufactured by the Reedsboro Chair Company, Reedsboro, Vt. The forward end of the promenade deck is closed in with Beclawat frameless plate glass windows supplied by the Kearfott Engineering Company, Inc., New York, for protection in bad weather. Similar windows are fitted across the forward end of the bridge deck as a shelter

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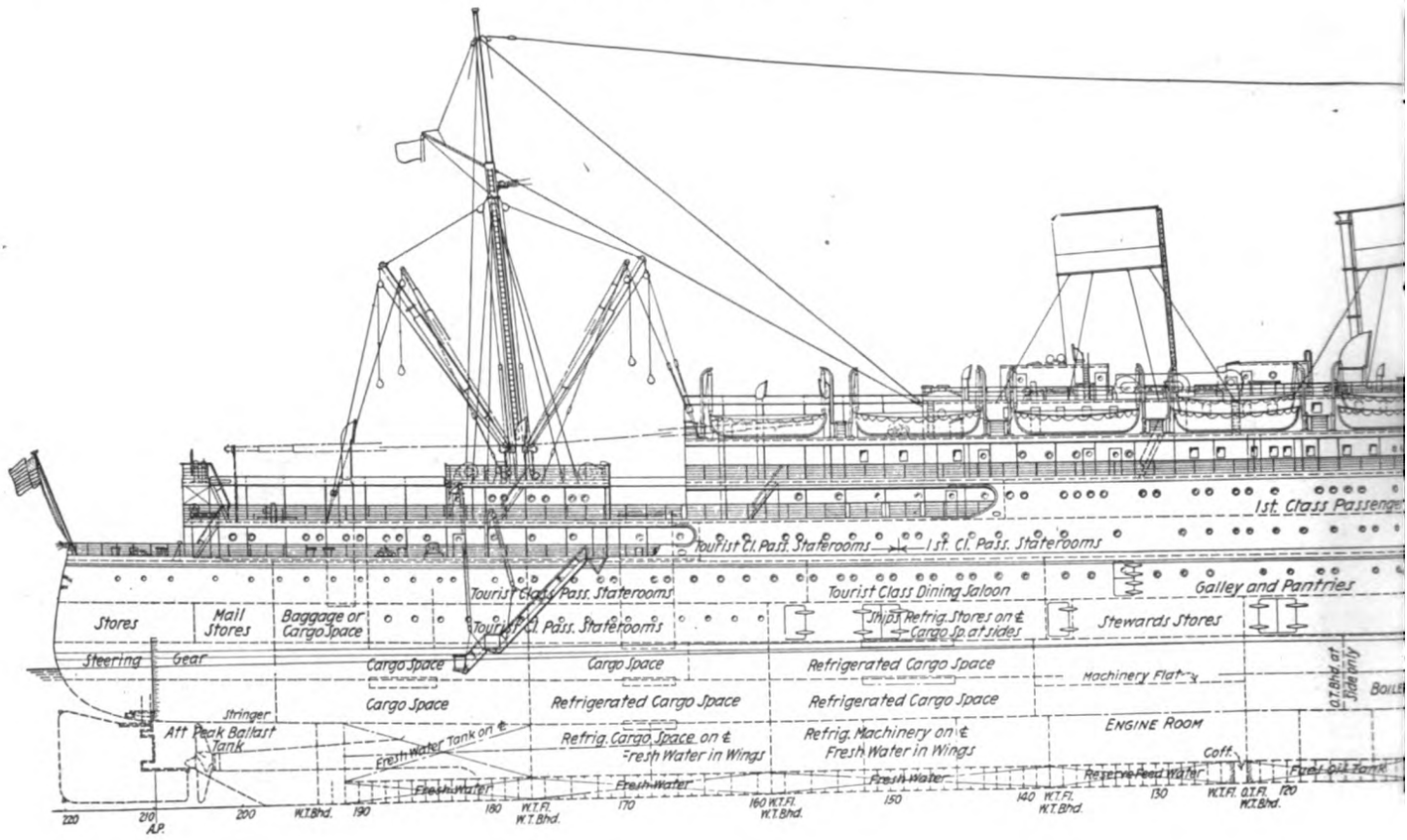
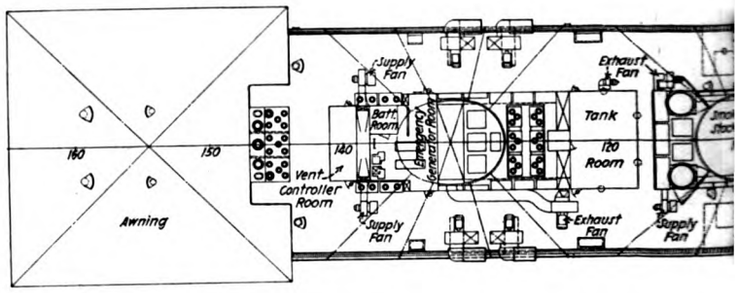
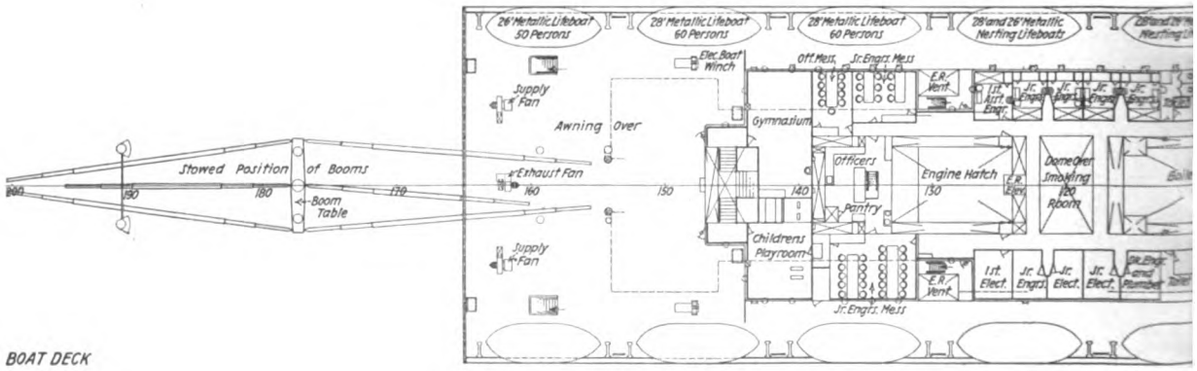




NAVIGATING BRIDGE DK.



BOAT DECK

Profile and plans of the navigati

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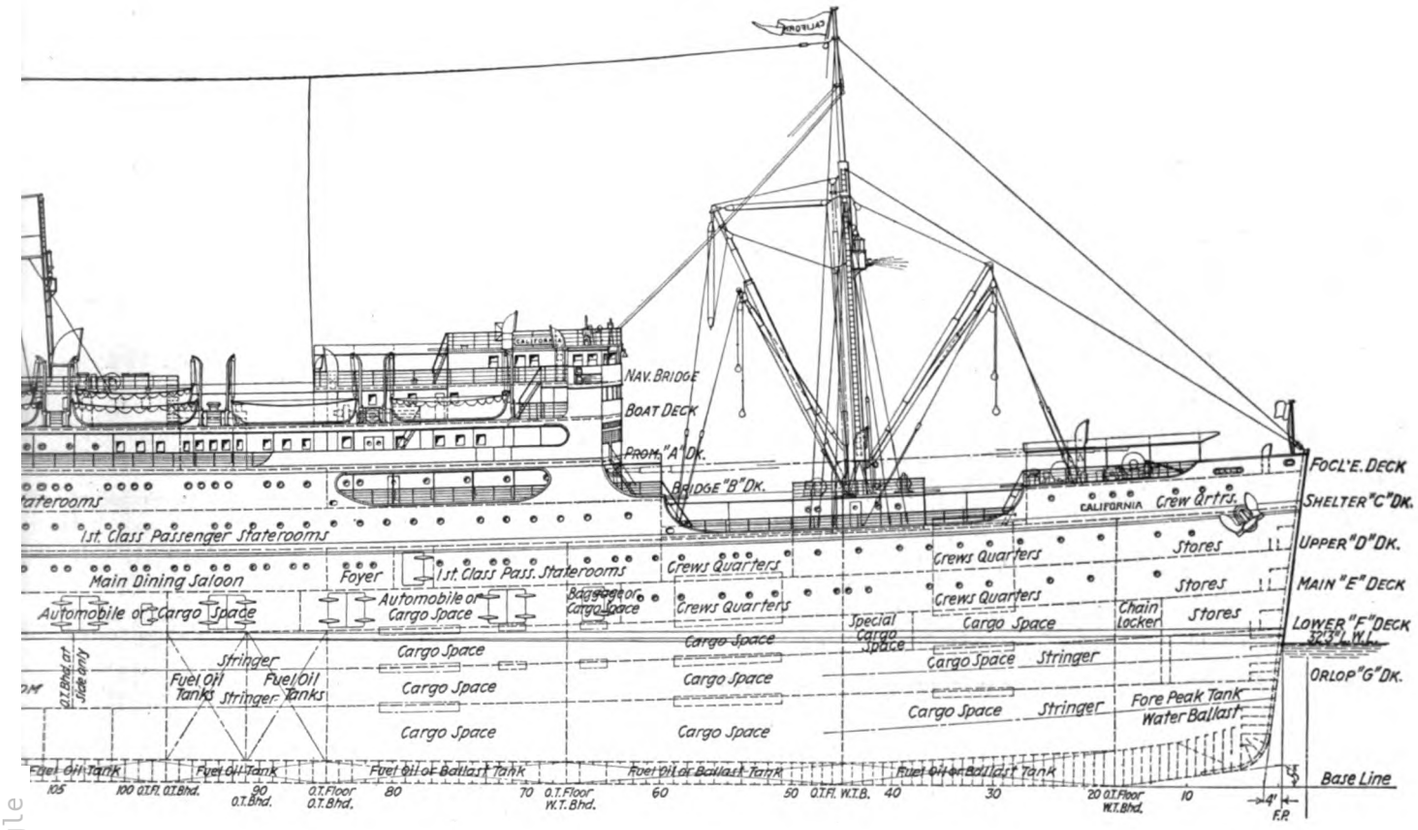

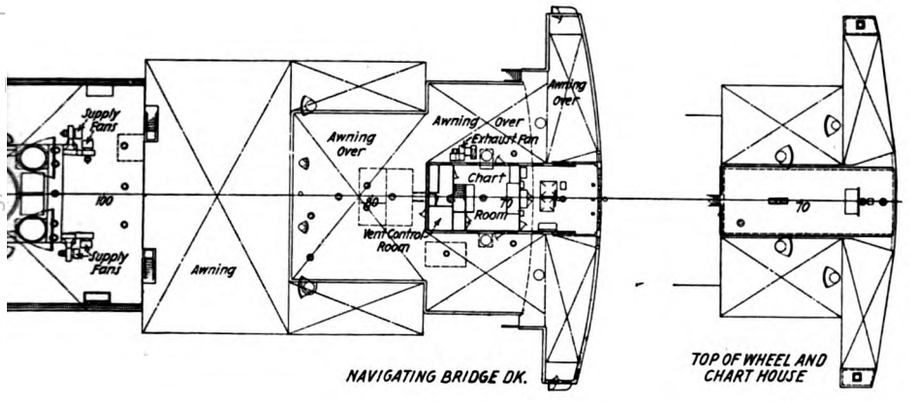

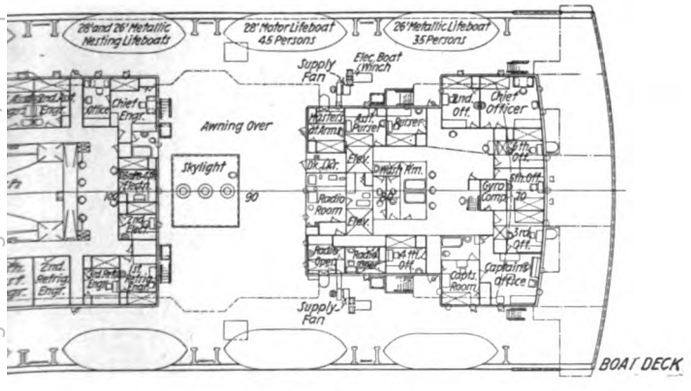

ge and boat decks of the California

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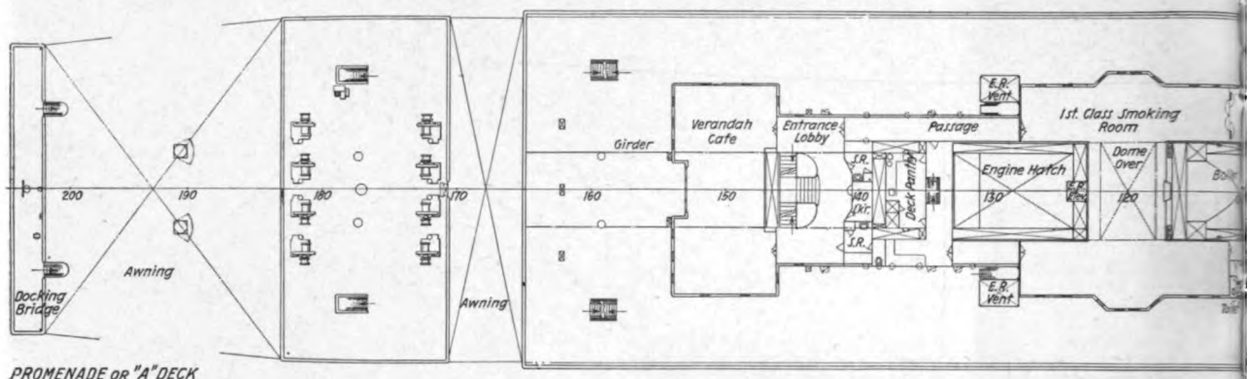
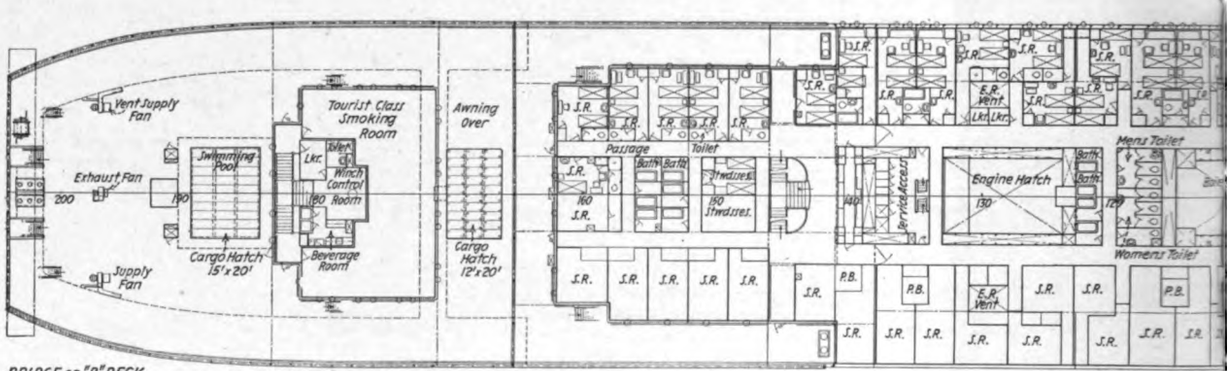
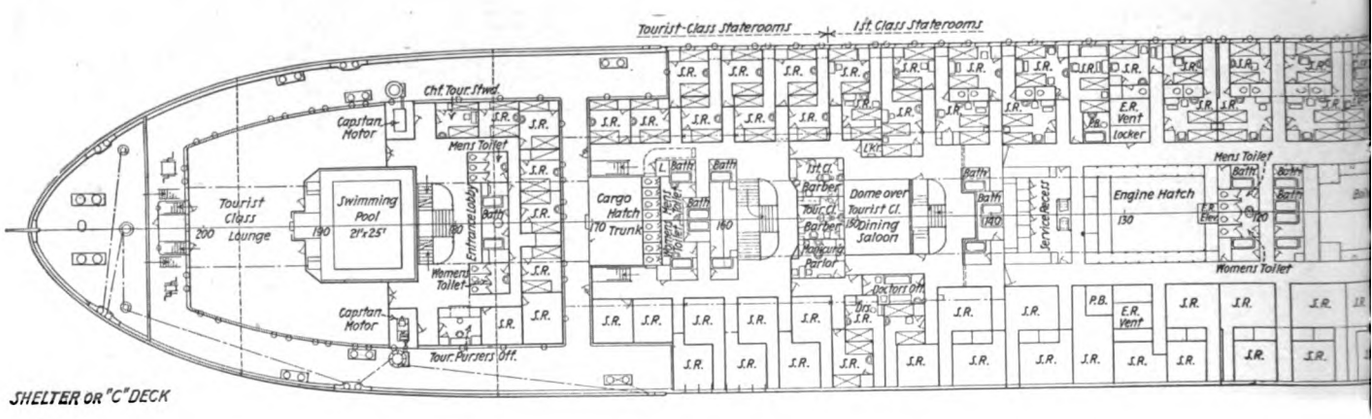


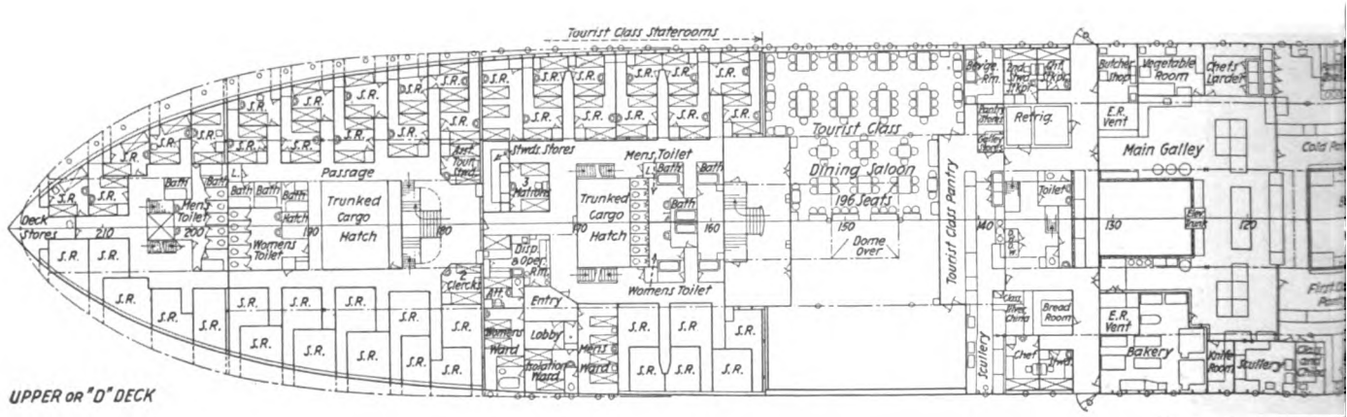
PROMENADE OR "A" DECK



BRIDGE OR "B" DECK



SHELTER OR "C" DECK



UPPER OR "D" DECK

Plan of A, B, C

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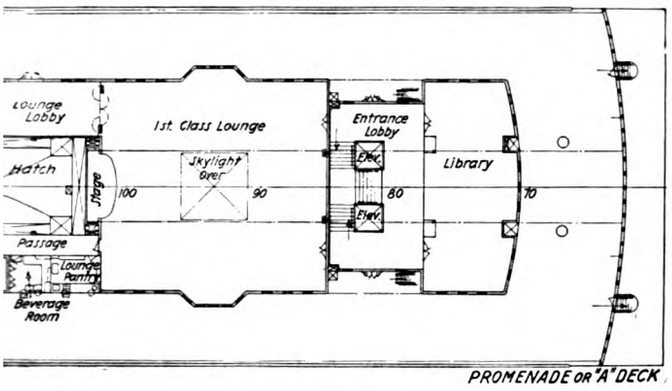

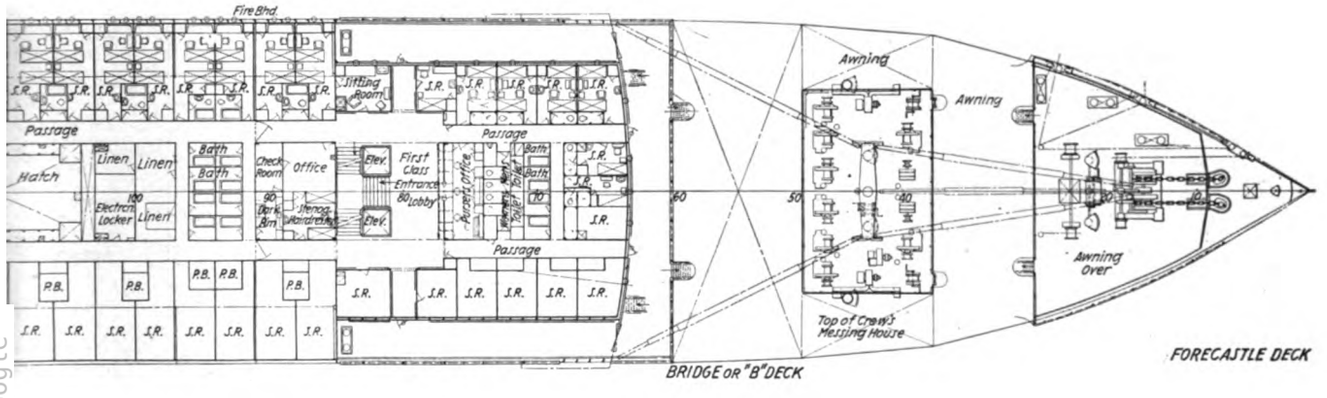

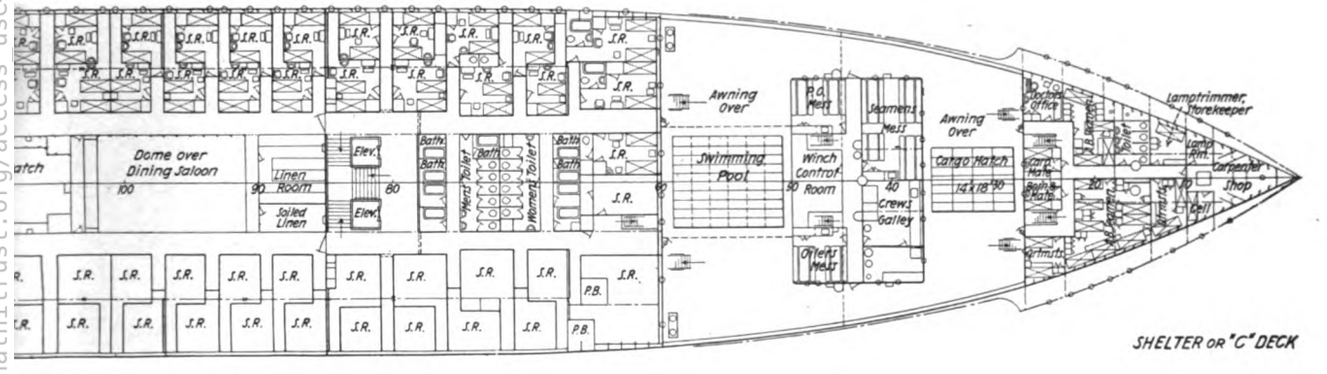

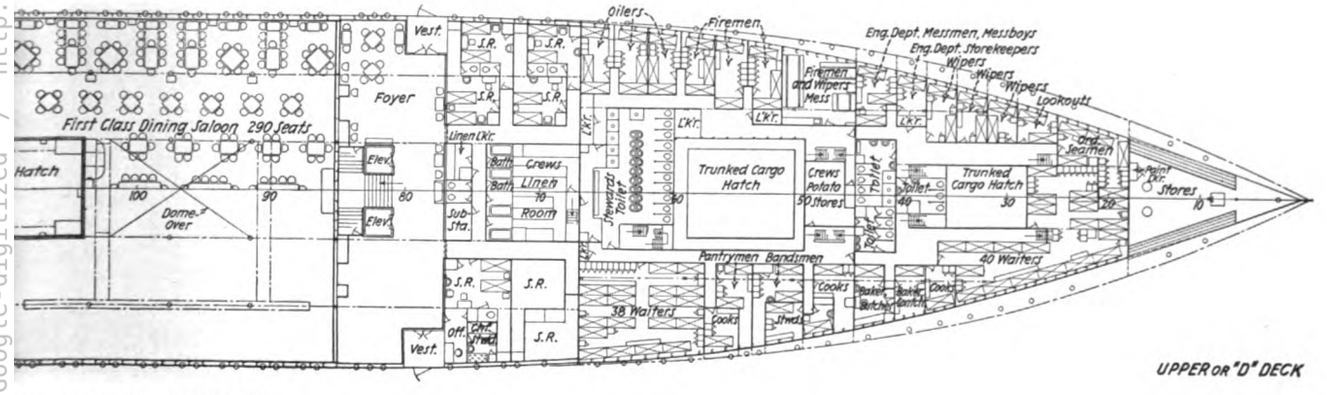

decks of the California

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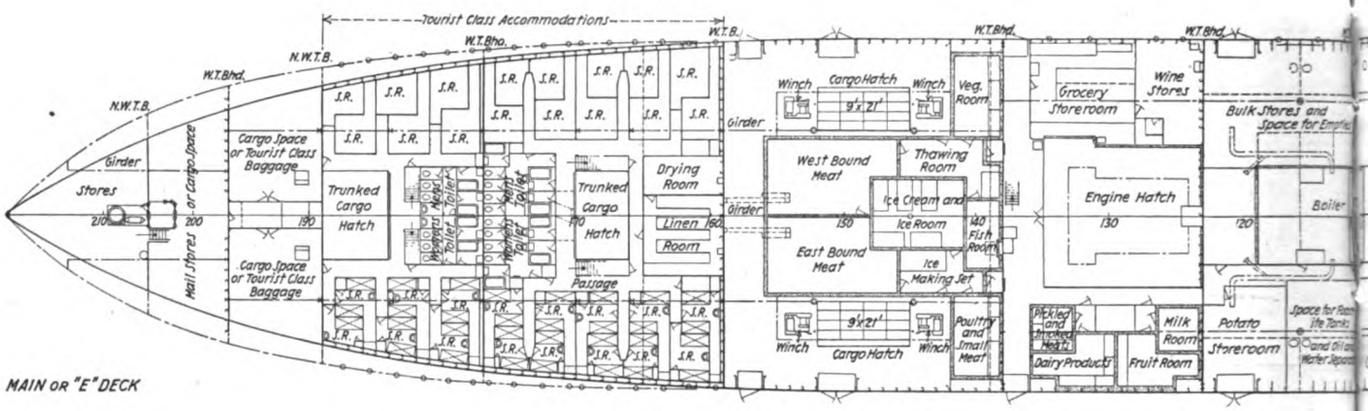

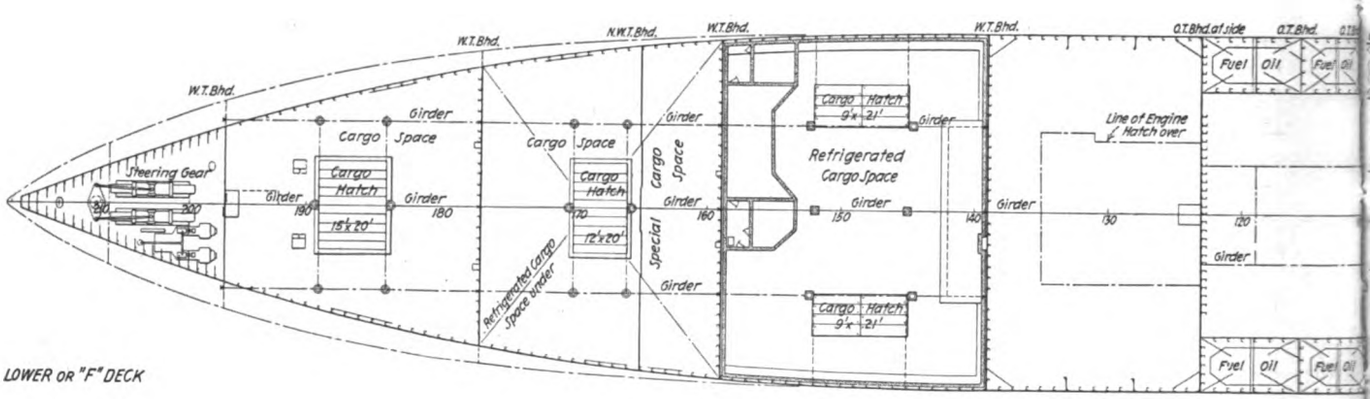

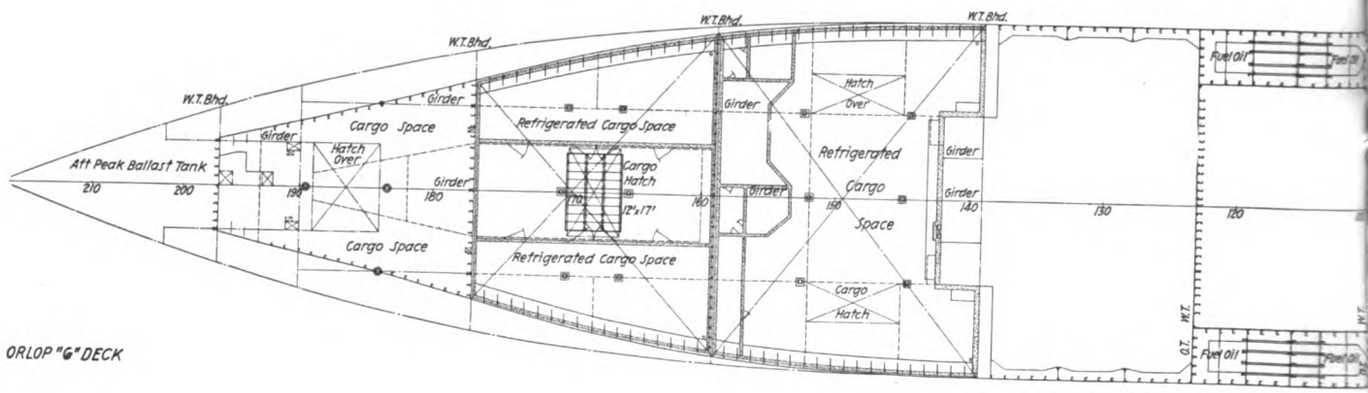

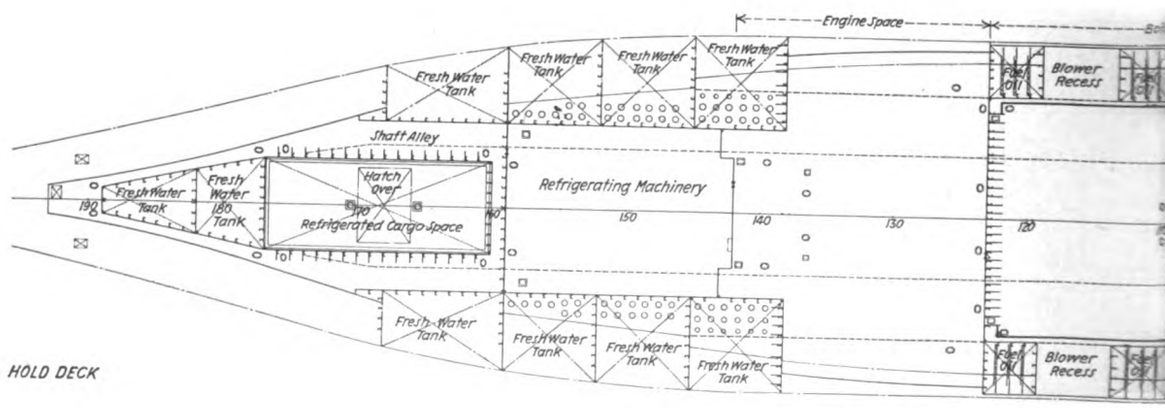

Plans of E, F, G, decks and

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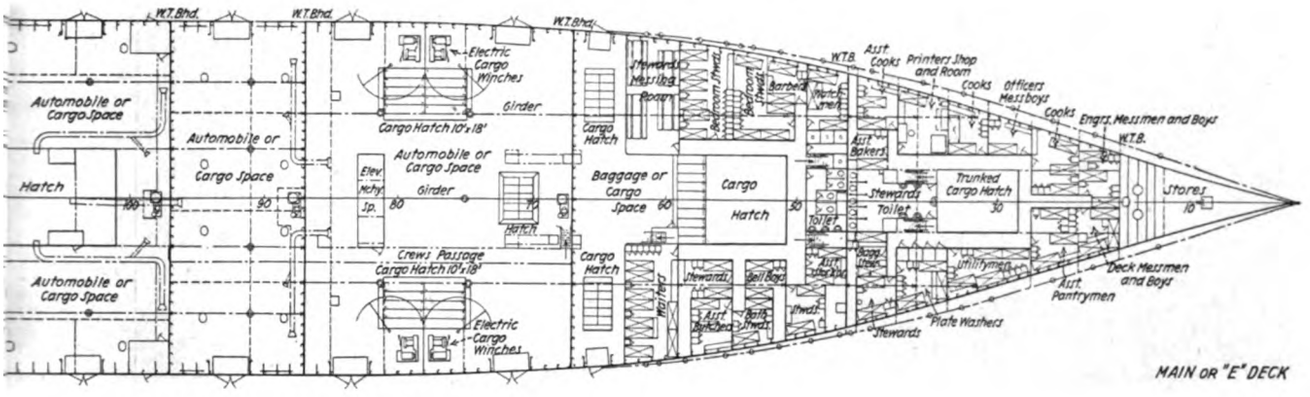

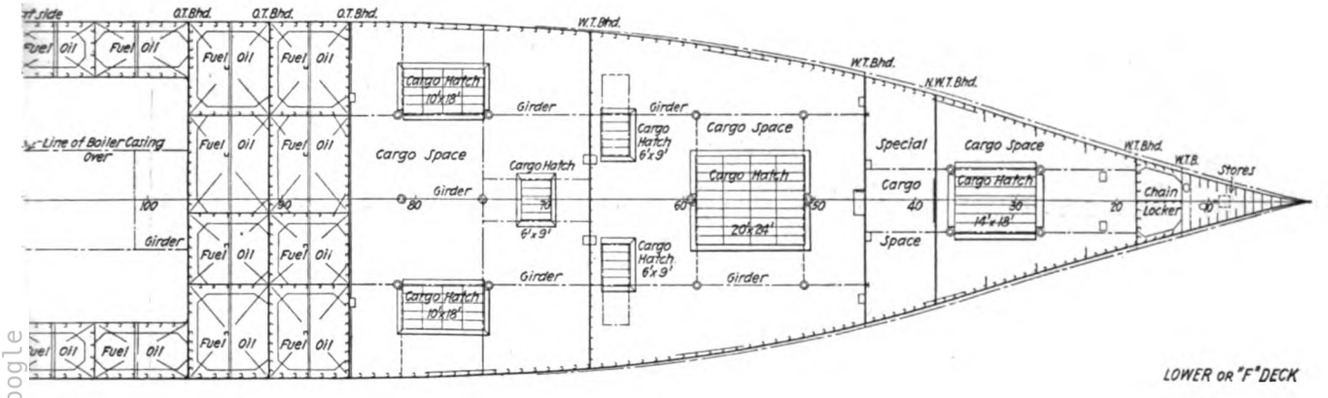

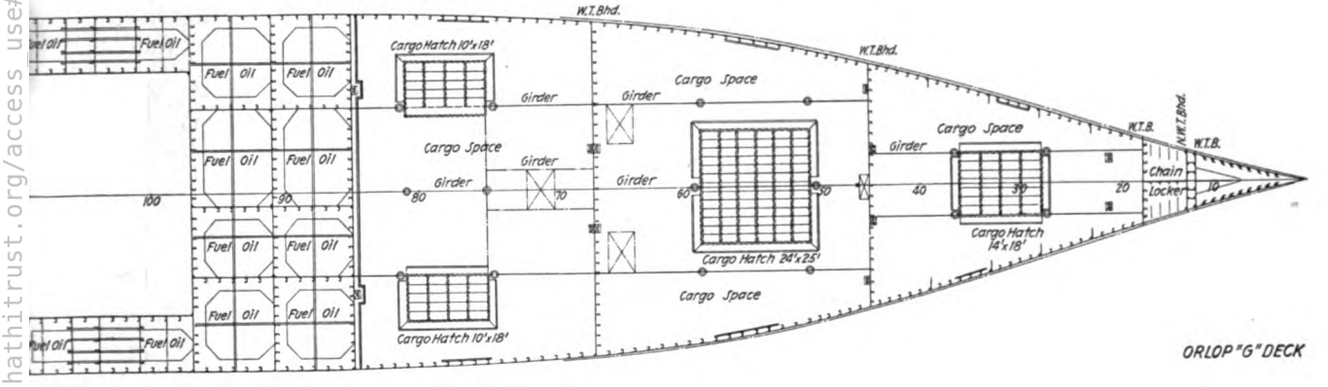

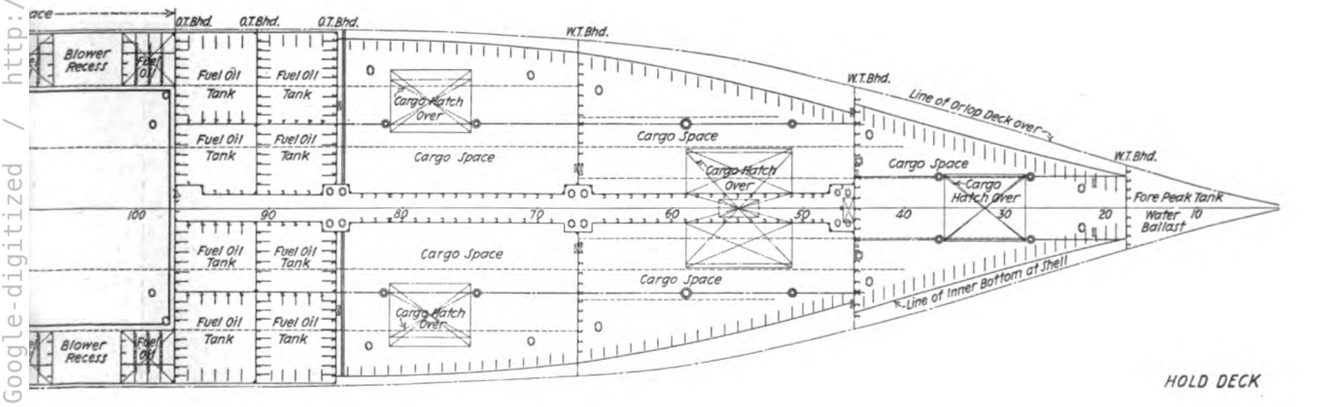

the hold of the California

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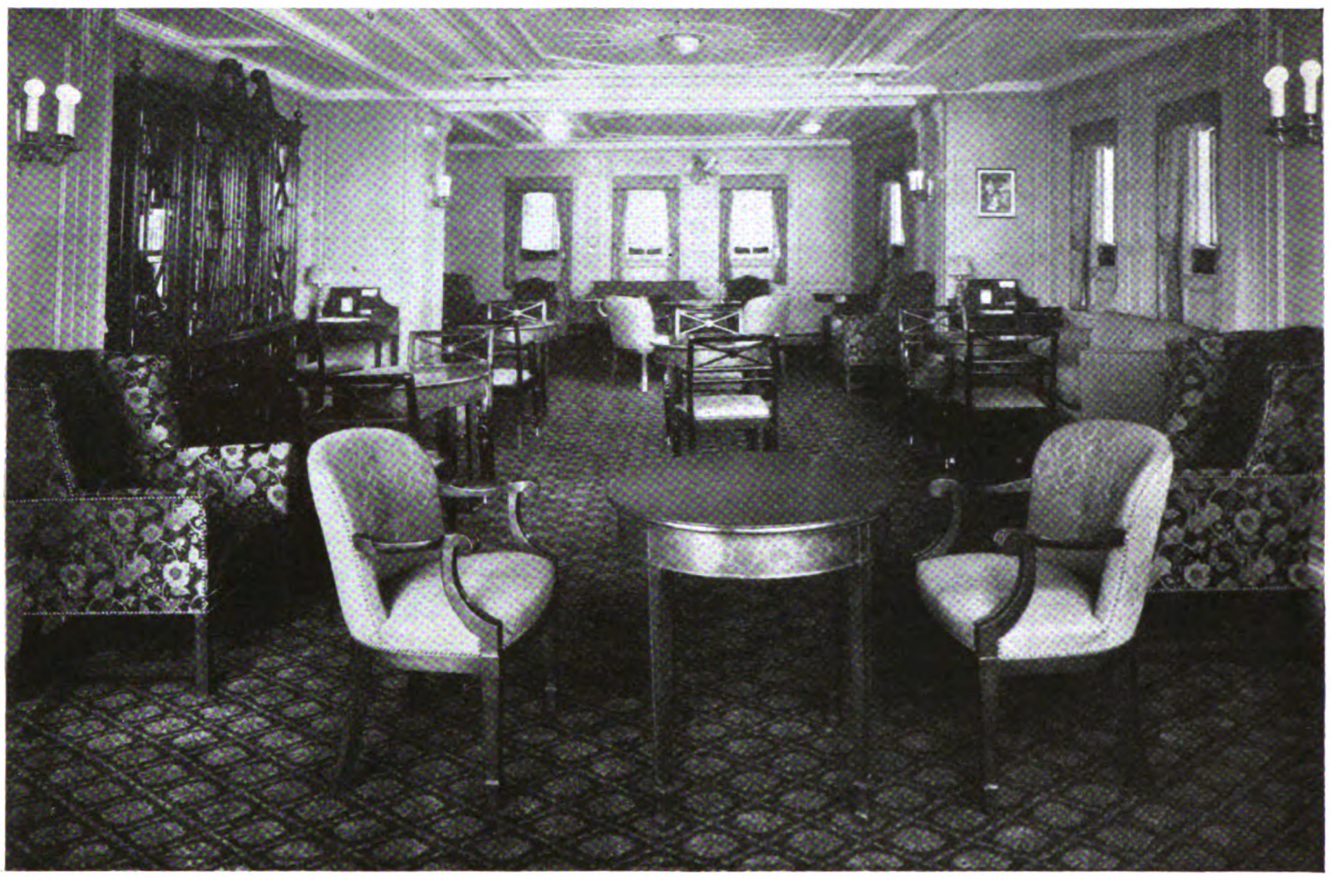
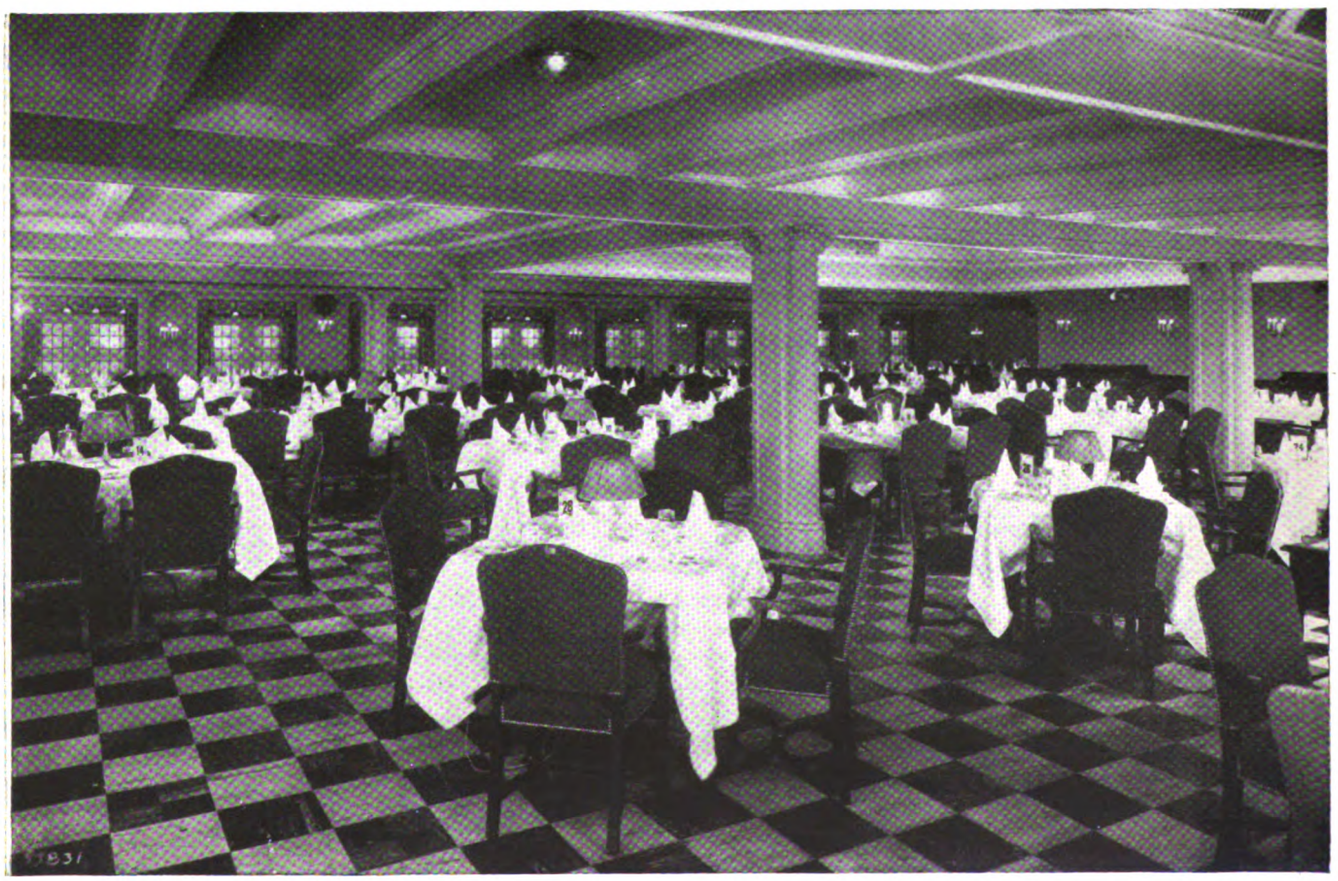


Library



First class dining room

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First class lounge

First class smoking room

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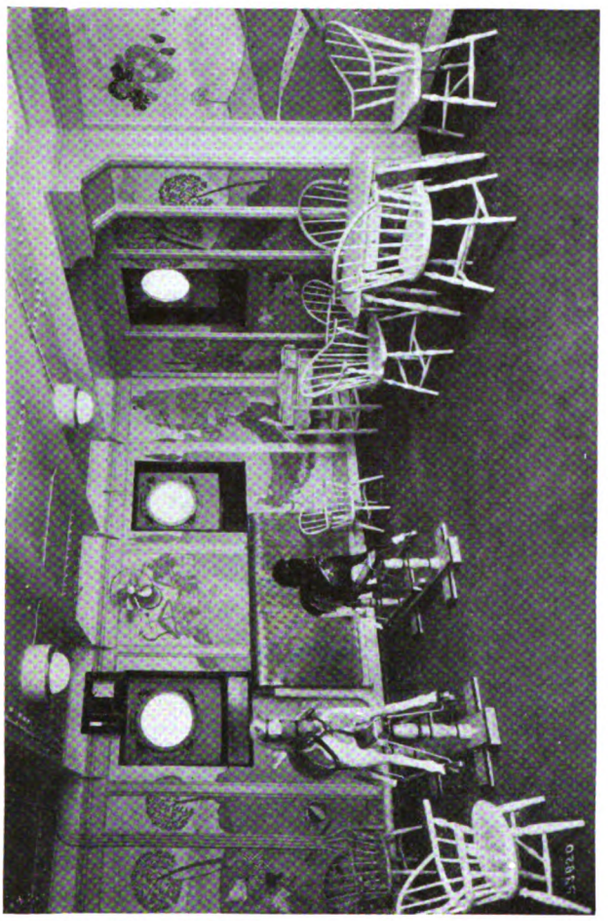
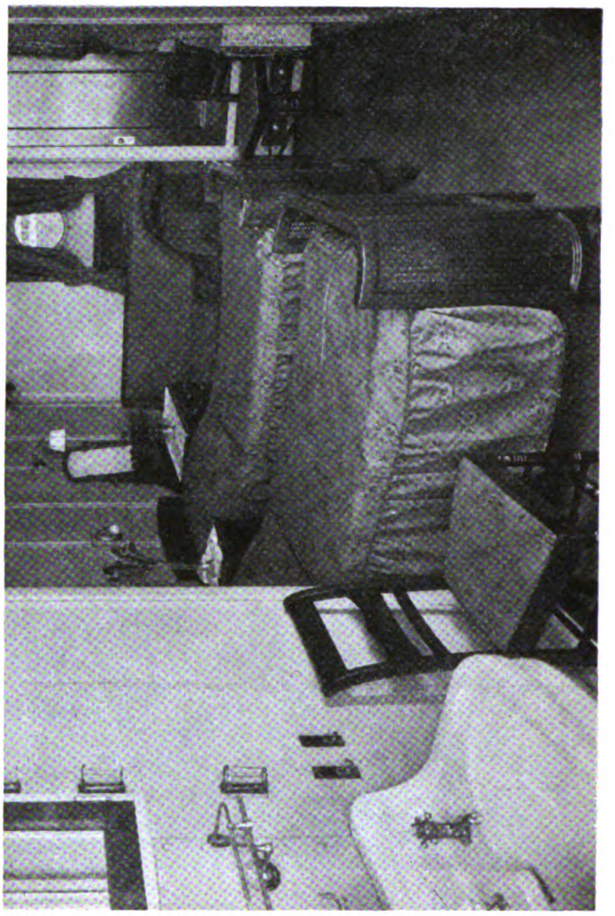
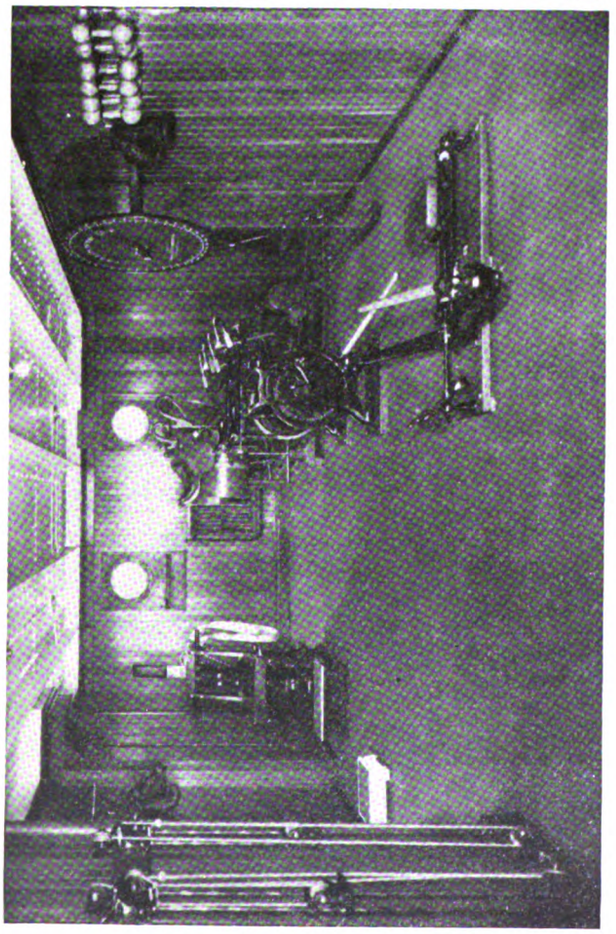


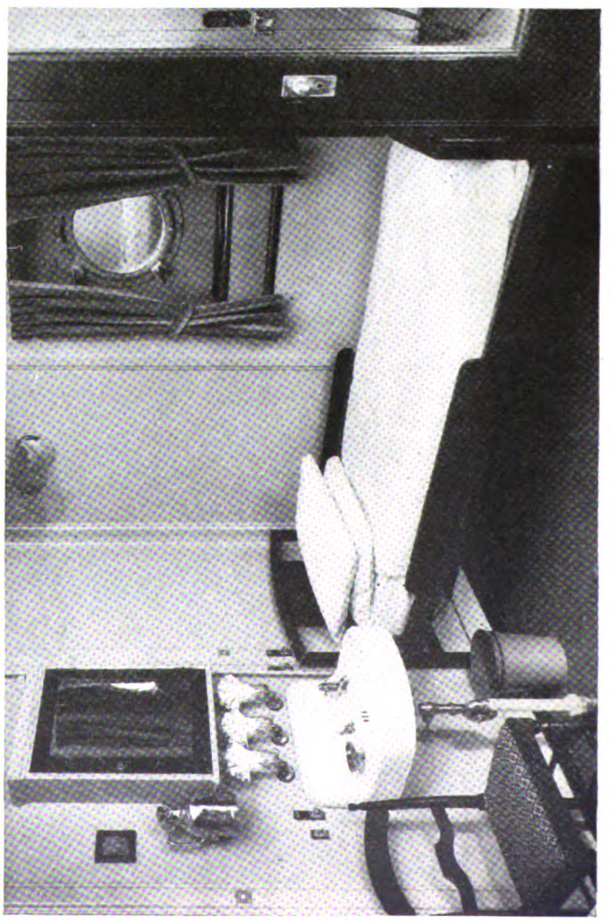
Children's playroom



First class stateroom



Gymnasium



Tourist stateroom

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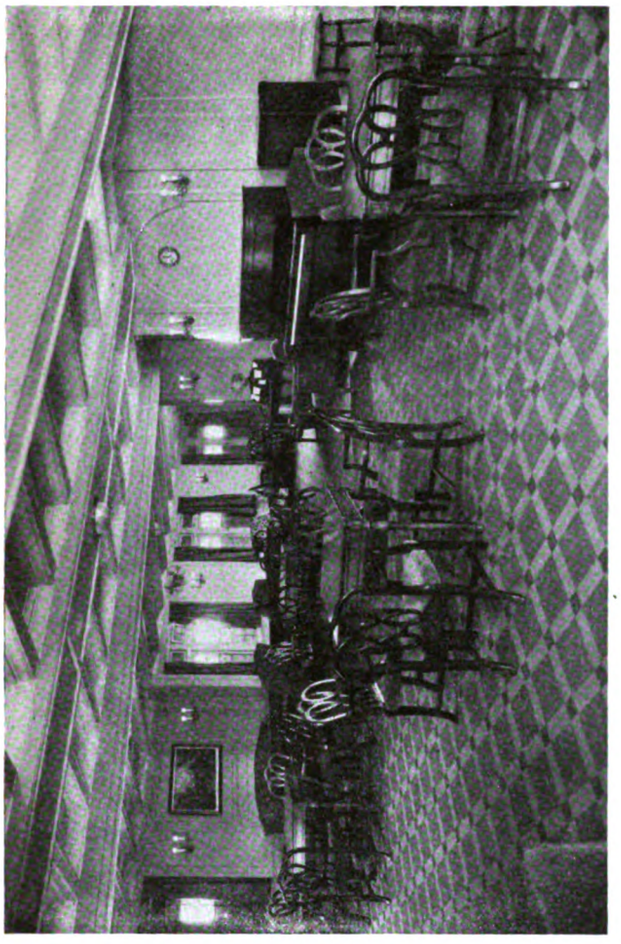
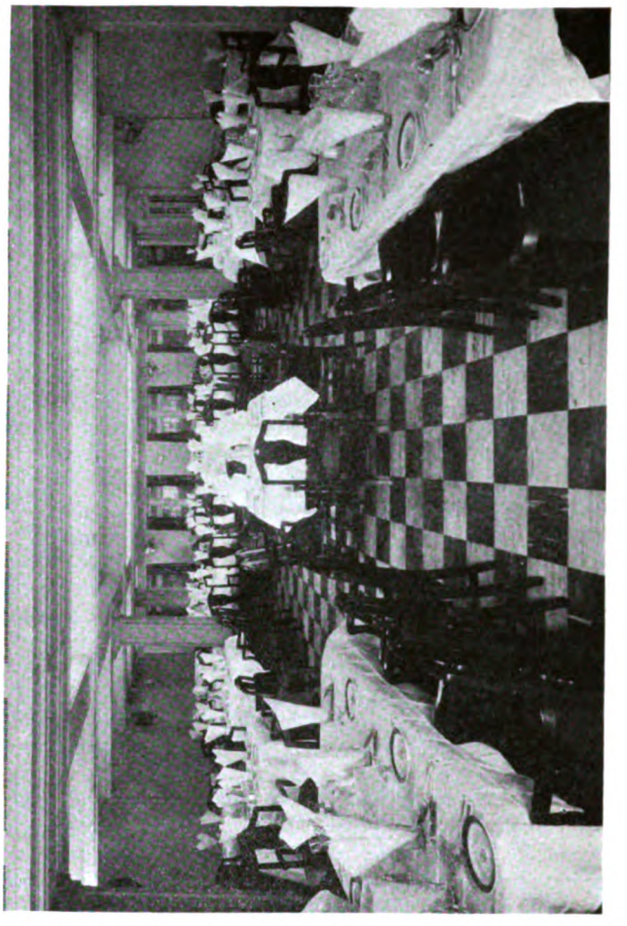


Tourist lounge



Tourist dining room

Tourist smoking room

Veranda café

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for the deck house. The windows in the public rooms are of the unitype supplied by the Kearfott Engineering Company.

Most of the boat deck is taken up by the officers' quarters and life boat stowage, but the after end is devoted to passenger recreation facilities, with a complete gymnasium, children's playroom and large open deck space, shaded by awnings, for sports and games. With the same idea, two large open air swimming pools are also provided, one on the shelter deck forward for first class passengers, and the other on the bridge deck aft for tourist class use. In both cases a trunked cargo hatchway between decks is utilized for the pool.

There are two main stairways, located forward and aft, opening onto spacious stair lobbies at each deck, which give access to all staterooms and public spaces. The forward stair lobbies are further served by two Otis electric elevators, one of which is used for baggage service. The two passenger elevators have a net lifting capacity of 1,800 pounds at 100 feet per minute and are of what is known as the geared traction type. They are operated by car switch control from a direct current supply of 220 volts furnished by the ship's power plant. The machines are located at the bottom of the hatchway. These cars travel from the D deck to A deck, stopping at four decks and traveling a total distance of 27 feet 6 inches. A third Otis elevator is located in the engine hatch for the use of the engineers. The engineers' elevator has a capacity of 1,000 pounds at 100 feet per minute and is operated by full automatic push button control from the same source of power. In this case the machine is located directly over the hatchway. The car rises from the engine room floor to the boat deck, a distance of 54 feet 6 inches.

Consistent with the *California's* American design and construction, and the intercoastal service for which she is intended, the joiner work, which was carried out by the builders of the ship, and the interior decorations, which are the work of Barnet Philips Company, New York, and J. Philip Kiesecker, associate, are of the American Colonial period, as exemplified by old mansions and public buildings still existing in the Atlantic states, or by types preserved in the new American wing of the Metropolitan Museum of Art at New York. Paintings of scenes in early American Colonial history have been made for this ship by Miss Glenna Latimer of Norfolk, Va. The principal lighting fixtures were designed and manufactured by Cox, Nostrand and Gunnison, Inc., Brooklyn, N. Y. The Shaw Furniture Company, Boston, Mass., supplied the furniture of the first class public rooms and Elgin A. Simonds Company, Syracuse, N. Y., for the tourist public rooms. The joiner hardware, most of which is of white metal and the remainder of polished bronze, was supplied by H. S. Getty & Company, Inc., of Philadelphia. Topping Bros., New York, supplied the gold and silver plated hardware. Plywood, furnished by the U. S. Plywood Company, is used for doors and partitions and the ceilings are panelled with Vehisote.

The first class main entrance lobby or foyer, on the upper deck forward of amidships, is full paneled in straight-grained oak, and is furnished with large overstuffed chairs and settees. In the first class dining room the paneling is finished in old ivory tone, and the sides of a large dome over the center of the room are fitted with mirrors in the form of windows, each with its painted brass balcony rail. The ports in the ship's side are concealed behind leaded glass casements, with draperies of glazed chintz in bright designs of flowers and fruits. The dining chairs, manufactured by the Marble and Shattuck Chair Company, Cleveland, are of Cuban mahogany, upholstered in grayish blue mohair. Rubber tiling in alternate squares of cream white, grayish black and salmon has been used for floor covering, with a border of black and green. The electric light fixtures are in the shape of a tall old silver candelabra, standing in niches in the paneled walls. There are built-in buffets and a long sideboard, all in mahogany with ebony trimmings, and special serving tables are provided, having electric warming tops. The dining tables are of various sizes to suit individual party requirements.

The first class lounge, nearly 50 feet square, combines the features of a living room and ball room. Wide bay windows provide an unusual amount of natural light and ventilation. An ornamental dome in the Georgian style is built in the center of the paneled ceiling. The walls of the lounge are finished in warm French gray, and the paneling is divided up by pilasters with carved capitals. A stage is provided for concerts and entertainments. On special occasions the Saxony wool rugs can be quickly taken up and the entire lounge, with its parquetry flooring, may be used as a ball room. The furniture includes tables for bridge and letter writing. All the upholstery is done in striking and harmonious colors and the hangings are of small patterned Colonial tapestry.

The library, with its tinted raised paneling and softly carpeted floor, is quiet and restful, and is equipped with built-in book cases of antique design, overstuffed easy chairs, and glass-topped writing desks.

The forward main stairway and adjoining lobbies are paneled in straight-grained oak, while the after stairs have painted finish, with simple but effective balustrades of painted brass.

The first class smoking room is unique in that it is finished after the manner of an interior in the Parson Capen house at Topsfield, Mass., built in 1676. The walls are paneled in hard knotty pine, skilfully aged to give an antique effect, and the ceiling is timbered. An early Colonial mantel of wood and a cupboard sideboard are special features. The lighting fixtures are in the shape of watchmen's hexagonal lanterns of brass and pewter. Mural decorations are in the form of old maps in the Dutch style, decorated with scenes in color illustrating the history of the pirates of the Caribbean.

All staterooms for both first class and tourist passengers are reached by inside passageways, without exposure to the weather. Private baths, toilets and showers are provided for most of the first class rooms, in addition to ample public toilet facilities for each class, and every stateroom has a lavatory with hot and cold running water, a Westinghouse wall type electric heater and a General Electric bracket fan. The plumbing fixtures were for the most part supplied by the Mott Company of Penna., the remainder being supplied by A. B. Sands and Son Company. The staterooms and public rooms have been designed for open and airy effects, and may be cooled by mechanical ventilation and electric fans to meet the tropical conditions encountered on the route, or closed and amply heated by steam radiators to suit winter service in the temperate zones.

The joiner work in the first class staterooms is finished in soft, harmonious and cheerful tints, the principal shades used being light green and rose. All rooms are equipped with Simmons metal beds having springs and Simmons hair mattresses, and accommodation for additional passengers is provided by sofa berths and folding Pullman "uppers." The other furniture, supplied by L. and J. G. Stickley, Fayetteville, N. Y., is of special design in American woods, upholstered in

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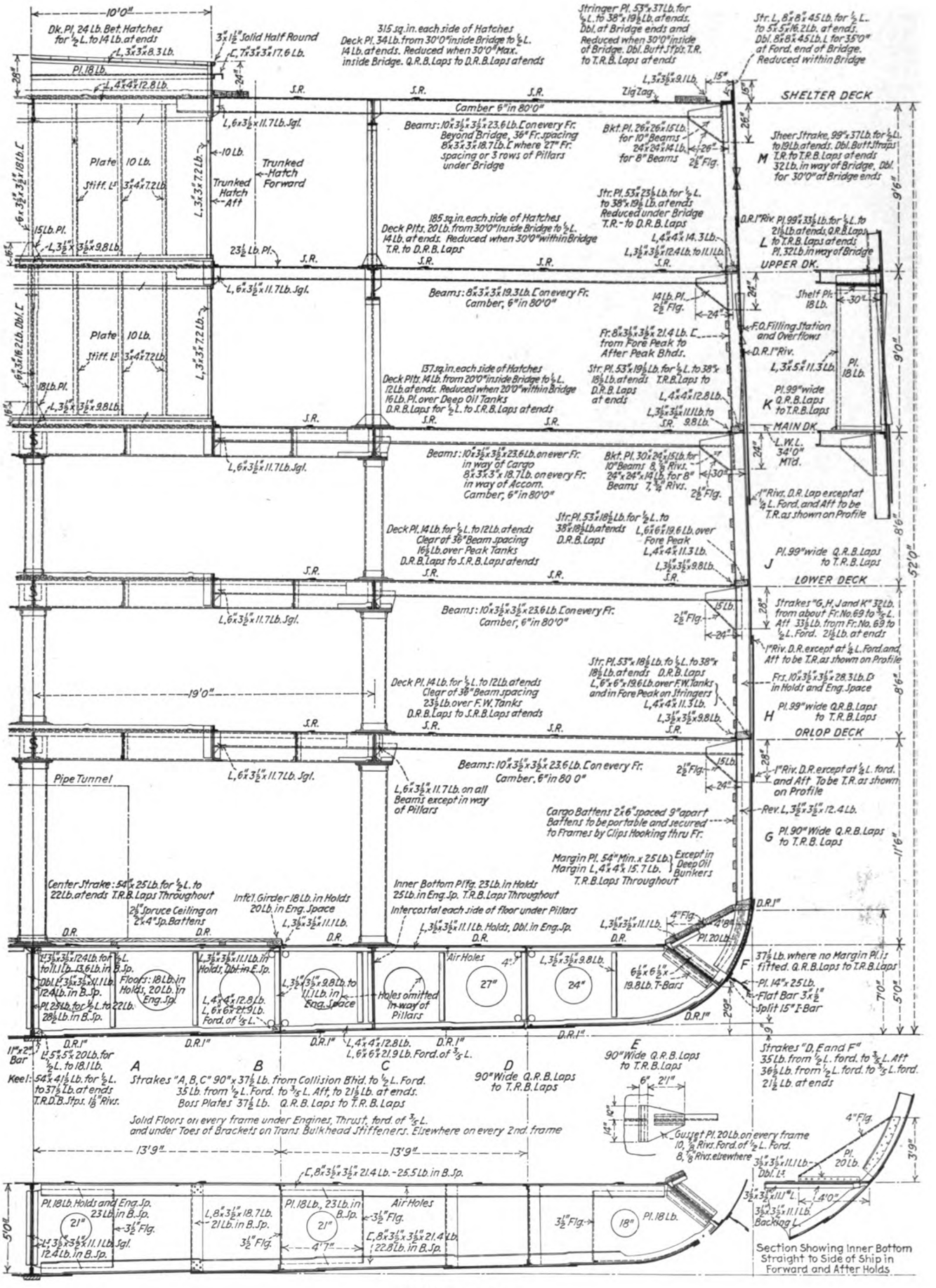
SHELTER DECK
UPPER DK.
MAIN DK
LOWER DECK
ORLOP DECK
Plate 10 Lb.
Stiff. L
Trunked Hatch Forward
Trunked Hatch Aft
Camber 6" in 80'0"
Pipe Tunnel
Cargo Battens 2'6" spaced 9" apart
Center Strake: 54" x 25 Lb. for ½ L. to 22 Lb. at ends T.R.B. Laps Throughout
Inner Bottom Plfg. 23 Lb. in Holds
Keel: 54" x 41½ Lb. for ½ L. to 37½ Lb. at ends
Strakes "A, B, C" 90" x 37½ Lb. from Collision Bhd. to ½ L. Ford.
Boss Plates 37½ Lb. Q.R.B. Laps to T.R.B. Laps
Solid Floors on every frame under Engines, Thrust, ford. of ⅗ L. and under Toes of Brackets on Trans. Bulkhead Stiffeners. Elsewhere on every 2nd. frame
Strakes "D, E and F" 35 Lb. from ½ L. ford. to ⅗ L. Aft 36½ Lb. from ½ L. ford. to ⅗ L. ford. 21½ Lb. at ends
Section Showing Inner Bottom Straight to Side of Ship in Forward and After Holds

Midship section

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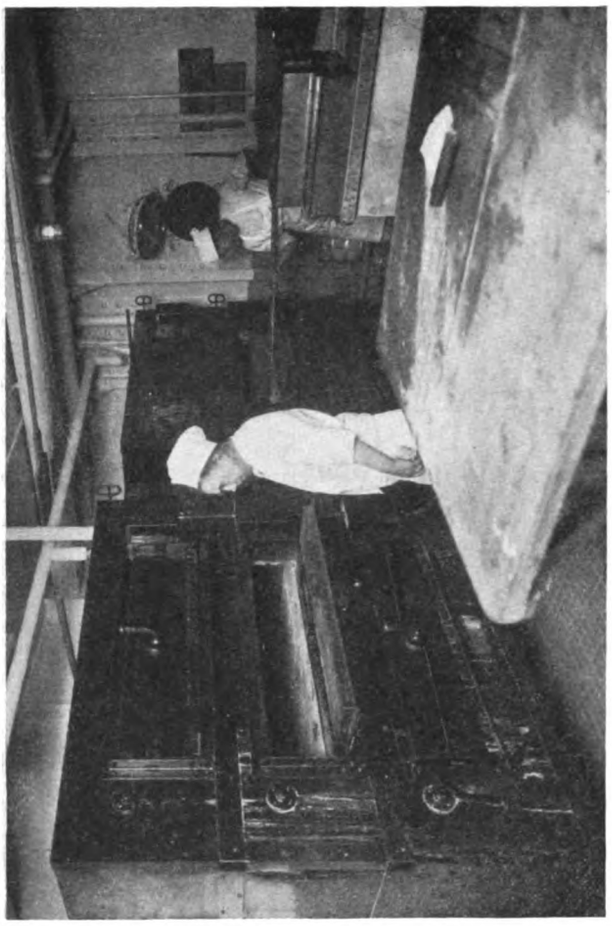
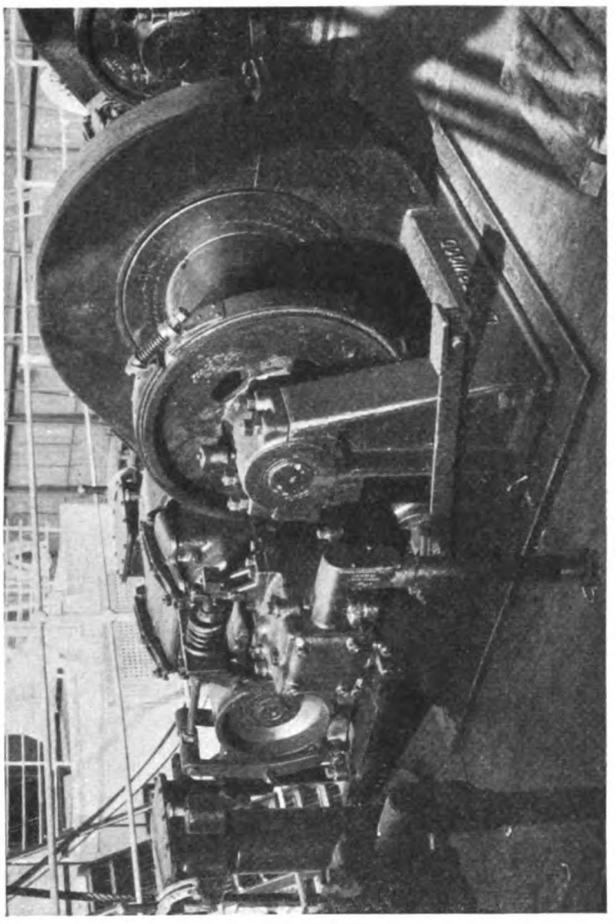
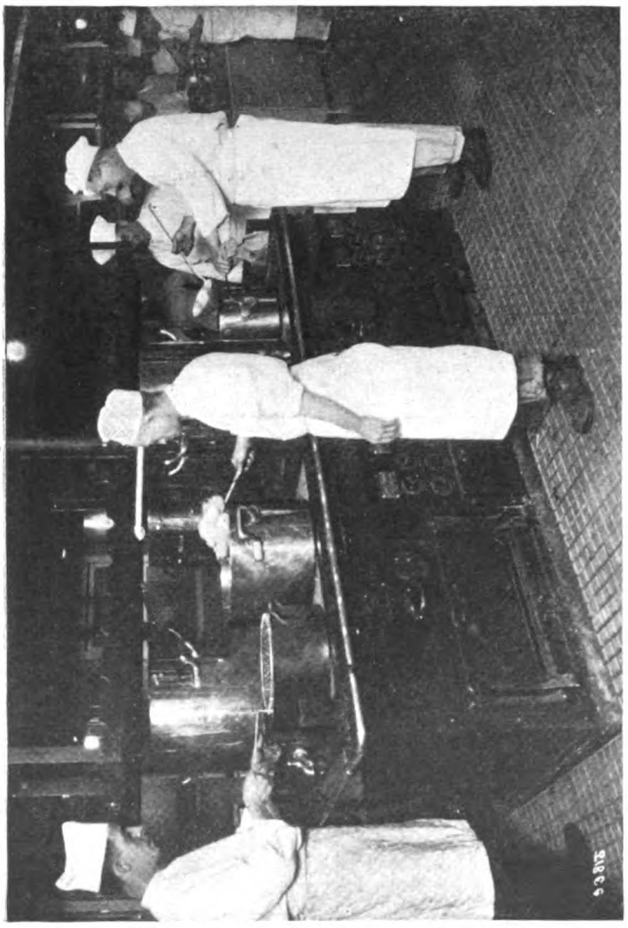


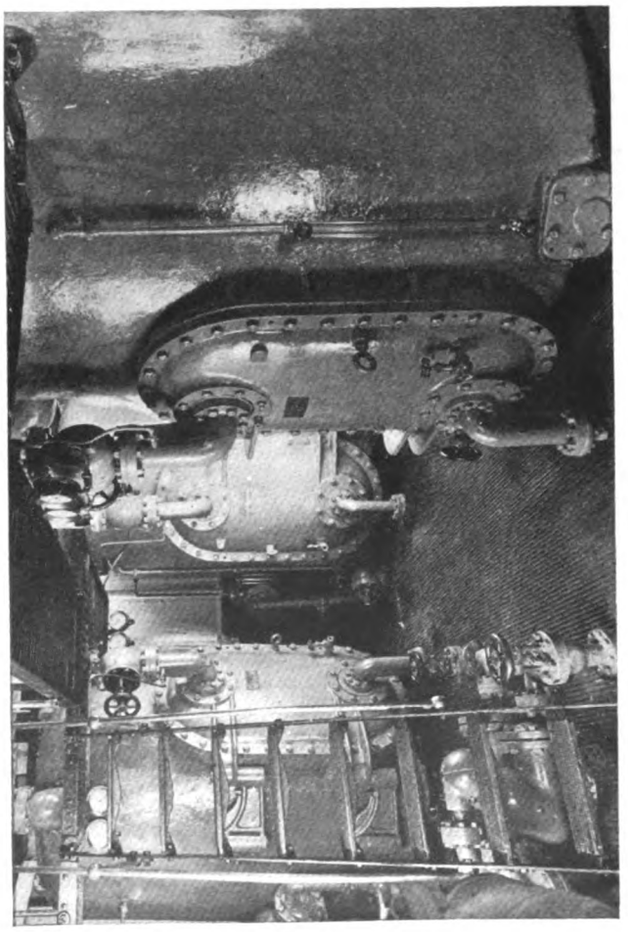
Bake ovens



Lidgerwood single geared cargo winch



Electric ranges



Evaporators

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fabrics patterned after Colonial models. The bedroom linen was supplied by Lady Pepperell mills and the blankets by St. Mary's mills. All public and private toilet spaces have tiled floors and a tile wainscot is fitted to half height in all passenger showers. Many of the first class rooms on the promenade deck are arranged en suite, with private sitting rooms.

Tourist Accommodations

As a whole, the arrangements for passengers on the *California* represent a development typically American, by which class distinctions are minimized, in that the first cabin's broad deck, spacious public rooms, outside staterooms with running water, and outdoor swimming pool, are duplicated in the tourist class accommodations. The tourist public rooms are large, airy and simply but tastefully furnished, and conform in general style of architecture with the first class public spaces, though they are of a less elaborate type in matter of detail.

The tourist lounge, 42 by 48 feet, is full paneled in old ivory tone, with small-patterned hangings of rose color at leaded glass casement windows. The floor covering is rubber tile and the furniture is covered with tapestry.

The dining saloon is 48 feet long, fore and aft, and occupies the full width of the ship on the upper deck amidships. The walls are paneled in soft tints and a dome of Colonial design is built into the center of the ceiling. The lighting fixtures are in antique silver finish. Tables are provided for two, four or eight persons each, and service is from the same galley that serves the first class dining saloon.

The tourist cabin smoking room has the same quaint and strikng interior design as the first class smoking room itself, though more simply worked out. The room is large and attractively situated in a deckhouse of its own on the bridge deck, overlooking the tourist swimming pool.

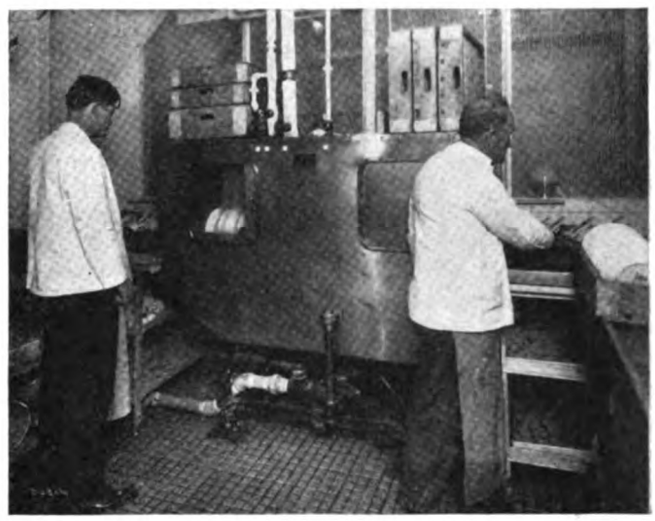
A large proportion of the tourist class staterooms are equipped with beds, and others have bed-berths of a new type, so that these accommodations represent a considerable advance in providing comfort in ocean travel at moderate rates.

Deck and Floor Covering

More than two acres of Selbalith magnesite deck covering, furnished by Selby, Battersby and Company, Philadelphia, are laid on the steel decks in way of passenger and crew accommodations. This forms a subfloor which is covered by carpets or hardwood floors as in the first class library and lounge, by rubber tiling in all other first class public rooms, lobbies and passages, and in the tourist lounge and smoking room, and by linoleum in the first class staterooms and officers' rooms. In the remaining spaces, Selbalith forms the finished floor, and is laid with a smooth surface tinted to harmonize with the joiner work. The rubber tiling, of which approximately 30,000 square feet was used, was manufactured and installed by the United States Rubber Company. The carpets and rugs were made by the Bigelow Company, Hartford, Conn.

Galley

The galley is electrically equipped throughout, the only fires used being charcoal fires under the broilers. The range and bake ovens were supplied by the Edison Electric Appliances Company, Inc. There are 12 heavy duty ranges and 2 bake ovens. The heating of the ranges is accomplished by "Calrod" units, consisting of nichrome resistance wire in the form of a helical coil centered in a steel tube and surrounded by finely divided, densely packed refractory insulation capable of withstanding high temperature and at the same time excluding air from the resistors. These units are cast into the hot plates of the range tops, so that there is no danger of fire or burn-outs due to oxidization or corro-



Dish washing machine

sion. The "Calrod" units are 9 by 24 inches and each range has four of these units.

Each bake oven has 3 compartments separately insulated so that any kind of baking can be done in any of the 3 compartments all at the same time. Three heat switches further enable economy of operation and

Pantry

the use of any desired temperature on the different decks of the oven. The ovens are of a new Edison construction having an interior lighting system and other features. Each oven has a capacity of 180 one-pound loaves of bread.

Other galley equipment includes electric griddles, toasters and hot plates, 2 Victor dishwashing machines, made of Monel metal, which were supplied by the Victor Special Machine Company, Trenton, N. J., a Davis

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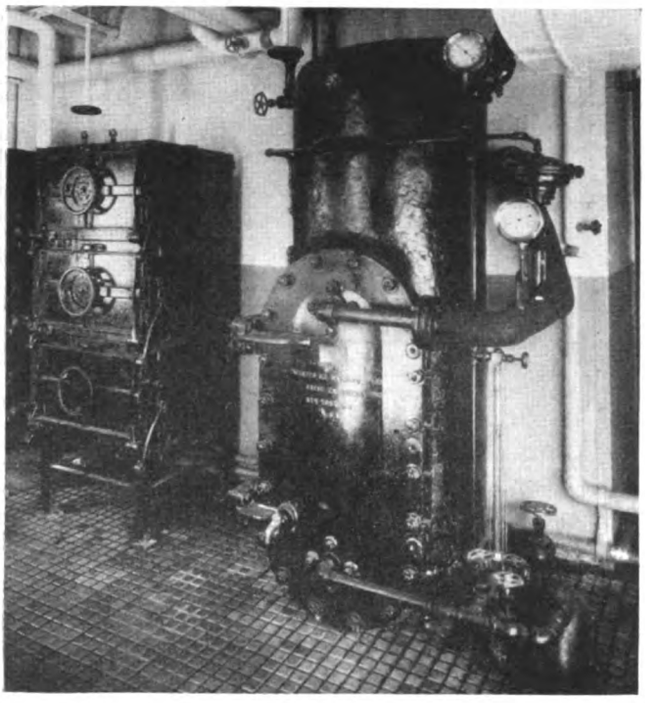
Paracoil clean steam generator, steam double jacketed boiling kettles and various electrical devices for preparing the food.

Pantries

The pantry arrangement is elaborate. There are four separate pantries, the largest being that connected with the first class dining saloon. There is another for the tourist cabin saloon, one for the officers and engineers, and another for the crew. Two McLaughlin automatic electric dumbwaiters, each of 100 pounds capacity, are installed.

Each of these pantries is equipped with tables for keeping food hot or cold, the hot pantries being arranged on the starboard side, and the cold on the port side.



Galley clean steam generator

There is a 15-foot steam table in the main pantry, besides a "bain marie," or hot water table. There is also a cold table with brine coils underneath, for salad dishes. Massive ice boxes close at hand for keeping meats, fish and fowl in readiness for the ranges insure quick service.

Storerooms also are near at hand and are spacious. The total capacity of the storerooms is 35,200 cubic feet.

The table linen was supplied by Gimbel Brothers, the china and glassware by L. Barth & Company, New York, and the silverware, consisting of 14,735 pieces of flatware and 3,900 pieces of hollow ware, by R. Wallace & Sons Manufacturing Company, Wallingford, Conn. Koeppen ware cooking utensils, which are of copper with a heavy lining of pure nickel, were supplied for the galley by L. Barth and Company.

Lifeboats

The lifeboat equipment, supplied by the Welin Davit and Boat Company, Long Island City, N. Y., is as follows:

2 26-foot boats with a capacity for 35 persons each.
8 26-foot boats with a capacity for 50 persons each.
10 28-foot boats with a capacity for 60 persons each.
2 28-foot boats with a capacity for 45 persons each.

Two of the 28-foot boats are fitted with masts and sails. The 26-foot boats are nested in pairs. The boats are handled under Welin type davits. For hoisting and lowering the boats four Hyde electrically operated boat winches are installed on the boat deck. Each winch has two horizontal gypsies 15 inches in diameter driven through worm gearing inclosed in an oiltight case by a 25 horsepower General Electric motor fitted with magnetic solenoid brakes. Each of these winches has a capacity of pulling 5,000 pounds at a speed of 100 feet per minute. There are also two motor driven lowering and hoisting winches, manufactured by the George F. Vaughan Corporation, supplied for wire rope falls. Each of the latter is capable of handling a loaded motor lifeboat.

Hull Machinery

All of the deck machinery, except the windlass and mooring winch, are electrically driven.

The steam windlass is of the Hyde horizontal spur geared type fitted with two wildcats arranged for operating independently of one and another. The engine is of the horizontal type self-contained on the same bed plate with the windlass, having cylinders 14 inches diameter by 14 inches stroke. The windlass is designed for hoisting simultaneously two bower anchors, each weighing 17,150 pounds, attached to 3⅛-inch stud link chain cable in a depth of 30 fathoms of water at a speed of 6 fathoms per minute. Large warping heads are fitted on the intermediate shaft of the windlass.

The steam warping winch located on the forecastle is of the Hyde compound geared type having double cylinders 10-inch diameter by 14 inches stroke. The engine is reversible by means of a reversing valve. The winch has large warping heads on an extended shaft, with heavy bearings; the warping heads are 26 inches diameter in the smallest part.

The steering gear, supplied by the Hyde Windlass Company, is of the hydro electric type consisting of two double plungers with connecting links to the rudder crosshead, with hydraulic cylinders also self-contained on one bed plate. There is a dual pumping unit, each of which is of sufficient capacity for operating the steering gear with the steamship going at maximum speed. Each pumping unit consists of a 75 horsepower motor operating a constant speed variable stroke pump which is fitted with a pressure regulator to prevent overloading of the motor. The steering gear is controlled from the wheel house and bridge by means of a Brown hydraulic telemotor. The steering gear is designed for handling the rudder to a total angle of 70 degrees at 30 seconds when the ship is moving ahead at a speed of 18 knots.

There are three electrically driven non-reversible Hyde gypsies. Two of the capstans are arranged with electric motors and gearing located on the same deck, with the motors located inside the after deck house. The gypsies have barrels 26 inches in diameter. The other electric gypsy is of the same size, but has its electrical equipment and gearing arranged on the deck below that on which the gypsy is supported. These gypsies were designed for exerting on rope a pull of 25,000 pounds at a speed of 50 feet per minute and to be capable of speeding up under light loads and obtaining a rope speed of 125 feet per minute.

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Cargo Handling

The cargo hatches and electric cargo winches on the *California* are laid out and designed especially for high speed loading and unloading of the ship. Twenty-six winches are used exclusively for cargo handling. The owners appreciate the need of high speed winches and winches capable of handling a high tonnage per hour, particularly for the hatches opening on the upper deck where a great depth of hold is encountered. Many cargo handling studies were made and the final winch installation decided upon was 16 Lidgerwood single geared high speed winches for the upper deck and 8 Lidgerwood double geared medium speed winches for the 'tween deck hatches. There are also installed two specially constructed winches built by the Shepherd Electric Crane & Hoist Company. All of these winches are driven by electrical equipment designed and built by the General Electric Company.

The winches on which the heaviest handling duty falls are the 16 high speed winches on the upper deck. The Lidgerwood Manufacturing Company, cooperating with the General Electric Company, designed these winches especially to fulfill the results of time studies made of conditions meeting the requirements of the *California*. The mechanical portions of the winch consist of a single keyed drum 16 inches in diameter, 20-inch face, with 26-inch diameter flanges. The drum is mounted on a very stiff drum shaft of high grade machinery steel turned throughout its length. This shaft runs in bearings provided with removable bronze bushings. The drum is driven from the motor through a single reduction of spur gearing with accurately machine cut teeth This gearing is totally enclosed in a cast iron housing made as part of the winch frame, so that it is impossible for the rope or any foreign material to cut into the gearing. A "non-burn" lined band brake operated by a foot pedal is mounted on the flange of the drum. Due to the electric control, to be explained later, such a foot brake at first glance seems unnecessary, but in actual service on other ships they have been found very useful in emergencies. Occasionally heavy pieces are handled without the electric solenoid brakes being properly adjusted, so that slipping occurs. Occasionally even the solenoids have been out of commission, but in any of these cases the foot brakes will control the load and assure a safe lowering.

The electrical equipment consists of a specially designed, totally enclosed watertight motor having a nominal rating of 25 horsepower at 310 revolutions per minute but designed especially to withstand heating for a severe duty cycle. The control is of the full magnetic type consisting of a reversible watertight master operating the control panel, which, with the resistors, is placed below deck. A full torque watertight solenoid brake is mounted on the motor armature shaft. Lowering is controlled by dynamic braking on the pay out direction of the controller. These winches will handle a hook load of 1,500 pounds, which was found to be the average load generally handled, at a speed of over 300 feet per minute. With this load the motors are capable of a continual output of about 65 tons per hour. The light hook speed will run up to about 500 revolutions per minute. Two-ton loads will be handled at a speed of about 185 feet per minute, and occasional loads up to three tons may be safely handled on a single line.

The eight 'tween deck winches are of the same general type of construction with drum sizes, foot brake arrangement, etc., duplicate of the single geared winches. There is, however, a double reduction of spur tooth gearing from motor to drum, this gearing also being totally enclosed in a cast iron housing. The electrical equipment consists of a 25 horsepower, 550 revolutions per minute motor with solenoid brake and control as described above. This winch has a duty rating of 4,000 pounds at 170 revolutions per minute, but does not have the high speed ranges at lighter loads, nor will the motor handle as high a tonnage as will the single geared winches.

There are 3 cargo holds forward below the main deck. Automobiles are carried on the main deck over the fuel oil deep tanks and as far forward as No. 3 hold. Space is available here for 100 automobiles and 40 more can be carried in the hold. Three American Engineering Company electrically driven automobile capstans of 15 horsepower at 100 feet per minute rope speed are provided.

Aft of the machinery space are air cooled cargo holds extending from the orlop to the main deck above which are spaces for the ship's refrigerated stores. Aft of the air cooled cargo hold is a brine cooled cargo hold and after that a hold for dry cargo. The refrigerating machinery is located between the shaft alleys directly aft of the engine room.

On each side of the vessel there are 6 cargo ports, each 7 feet 4 inches high by 8 feet wide; two cargo ports, each 7 feet 4 inches high by 4 feet 6 inches wide; two ports for handling ship's stores, each 7 feet 4 inches high by 4 feet 6 inches wide; one fuel oil port and one passenger entrance port on D deck; making 24 side ports in all. Forward on the shelter deck are two hatches extending to the cargo holds, No. 1 being 14 feet by 18 feet and No. 2, 20 feet by 24 feet. There are also two 18-foot by 10-foot blind hatches in the main deck between the two forward cargo ports. Aft, there are two hatches extending from the bridge deck to the holds, the forward hatch being 12 feet by 20 feet and the after hatch 15 feet by 20 feet.

In the watertight bulkheads of the ship there are 12 watertight doors which are electrically operated either from the bridge or locally by Dean valve control units, manufactured by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

Electrically Operated Watertight Doors

The C-H-Dean unit consists of a driving motor, suitable reduction gears, limit switch mechanism to stop the drive in both directions and an automatic clutch to disconnect the high speed rotating parts the instant the limit switch breaks the control circuit, thereby accomplishing an instantaneous stop without drift. The entire equipment is contained in a single case which makes it as compact as possible and lends itself readily to this application on shipboard where it is essential to conserve space.

The driving motor is totally enclosed as shown and is splash proof. It has a high starting torque and is connected to a system of combination worm and planetary gearing for the necessary reduction in speed on the slow speed shaft, which connects with the worm shaft of the watertight door for opening and closing.

The motor shaft is coupled to the worm shaft by means of a suitable clutch, both the motor and worm shafts running in ball bearings. The worm shaft drives a worm gear which is keyed to a sleeve, the other end of which forms the sun pinion studs which are forced into a flange forming part of the slow speed driving shaft. The planet pinions mesh into an internal gear which is the outer member of the planetary gear system.

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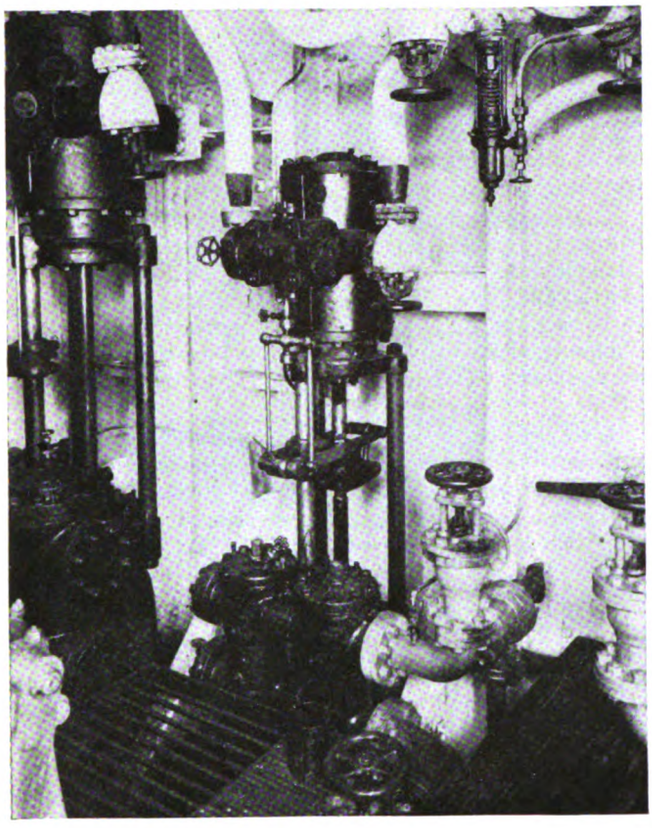
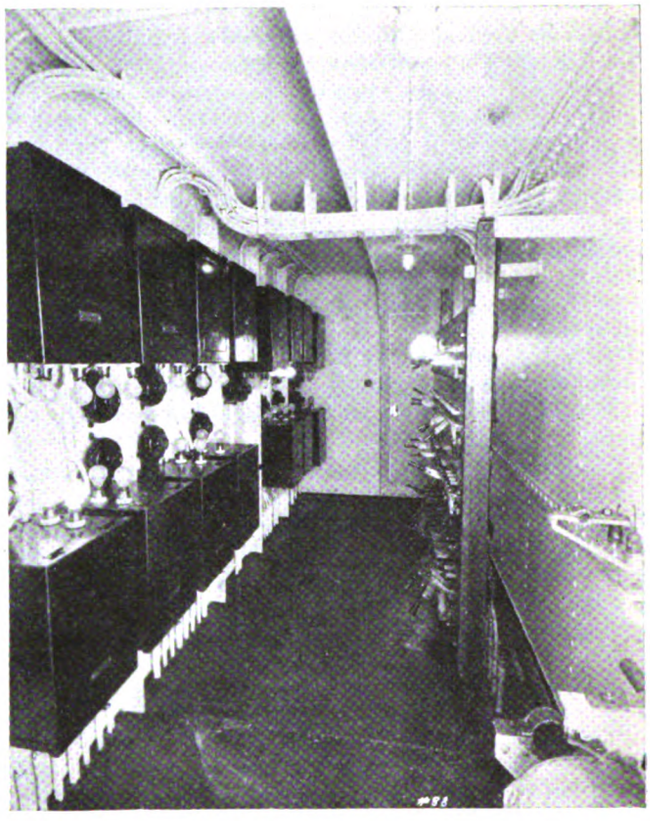
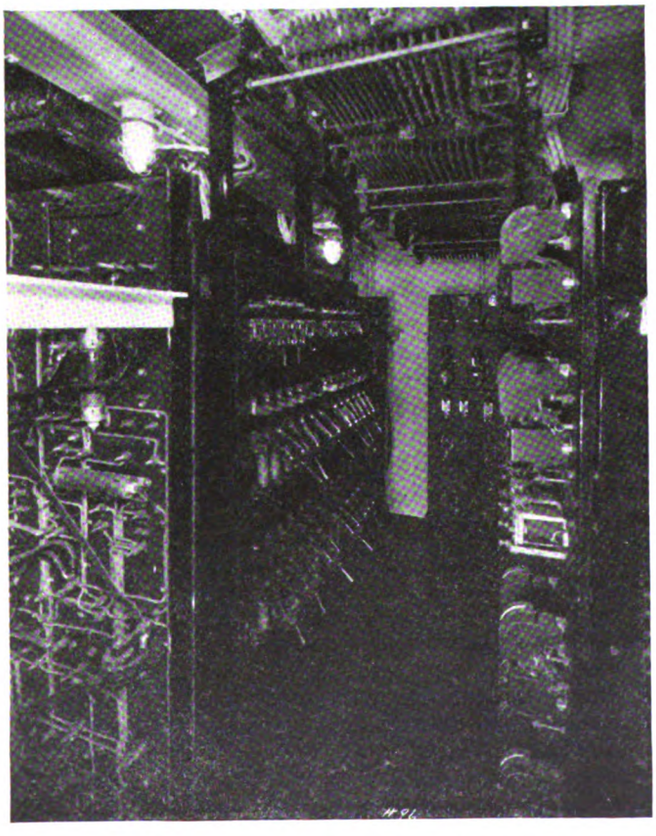


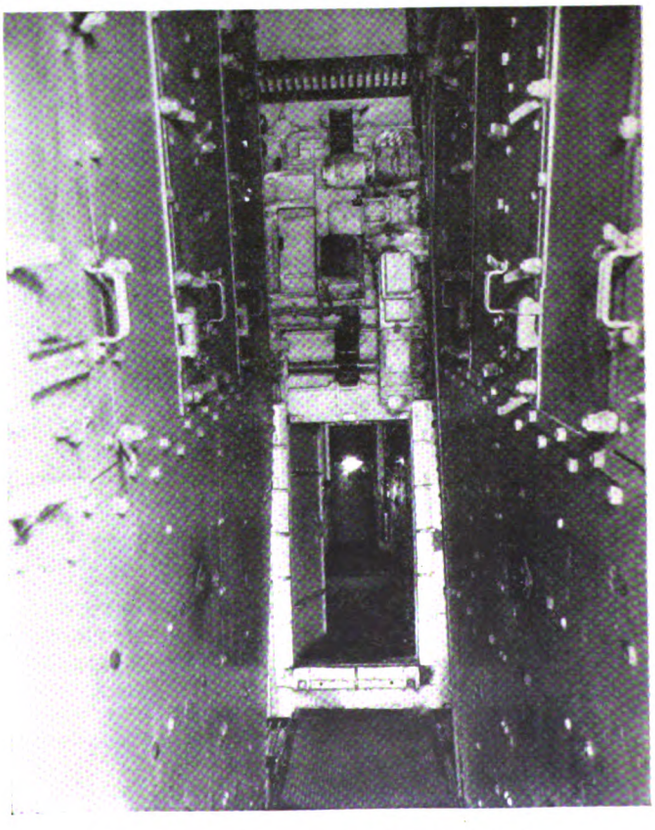
Fuel oil pump



Ventilating control space, power station No. 2



Test panels and lamp bank



Vertical electrically operated watertight door

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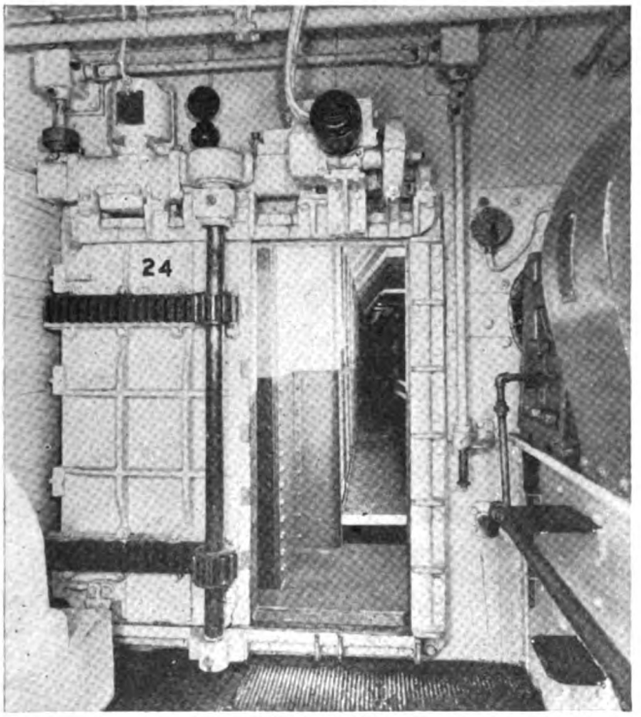
This internal gear fits into a machined recess in the casing and revolves freely in its bearings. It is provided on its outer surface with a peripheral channel containing a stop which engages a restraining pawl when the latter is moved into the clutch position by the action of a solenoid. The latter straightens a holding toggle when the circuit is energized and holds the pawl rigidly in place.

When the motor is started, the internal gear revolves until the stop is brought up against the pawl, suddenly arresting the movement of the internal gear and producing the starting blow which is effective in starting the door on its open or closed travel. With the internal gear stopped, the slow speed, or driving shaft revolves in the selected direction.

The entire equipment was designed and built to withstand the severe operating conditions experienced on shipboard, such as the corrosive action of salt atmosphere, incidental roll and pitch of the ship.

In addition to the C-H Dean unit the engineers of the Newport News Shipbuilding and Dry Dock company designed the gear drive between the unit shaft and door to incorporate a worm gear reduction with a compression spring to take the thrust of the worm when operating the door in the closing direction. A small limit switch is incorporated in this drive so that the tight closing of the door causes the switch to trip when the spring compresses due to the thrust of the worm. This in-

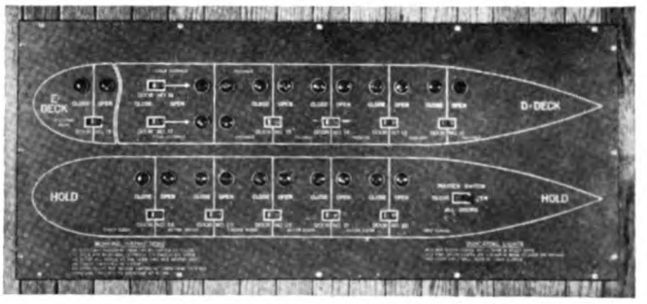


Horizontal electrically operated watertight door

sures tight sealing of the door and maintains a constant pressure on the door when seated.

A solenoid operated clutch is also furnished to automatically declutch all hand operating mechanism while the door is being operated electrically and clutching the hand operating mechanism to the door the instant the electrical connections are broken, thereby insuring hand operation of the door from a location above the water line should the electrical supply fail. A special bulkhead type operating switch is mounted adjacent to each door with the shaft extending through the bulkhead and provided with an operating handle on each side of the bulkhead. Each door may be operated from these switches depending on circumstances which will be described later.

A centralized control panel is mounted in the wheel house for the emergency control of all doors. The panel



Indicator panel for watertight doors

consists of a monel metal plate with the outline of the ship and bulkheads etched. Small switches and indicating lights are located in the diagram in positions corresponding to the location of each watertight door. A master switch is also located on this panel for the closing of all doors in an extreme emergency.

In order to obtain a reliable electrical supply the equipment is arranged to operate on direct current, which is normally supplied from a generator and in an emergency, should the generator be out of service, from a storage battery.

A special timing relay panel is provided to operate in conjunction with the master switch on the centralized panel. The momentary contact of the master switch starts the timing relays in operation and these, in turn start each door closing. The time is adjustable and is set for sufficient intervals to allow the starting current inrush to drop off on each equipment before the next one is thrown across the line. This takes the strain off the battery that would result from attempting to start all doors closing at the same instant.

Navigating Equipment

Both gyroscopic and magnetic compasses are installed. The gyroscopic compass system, installed by the Sperry Gyroscope Company, Brooklyn, N. Y., consists of a master compass and four repeater compasses, two being located in the wheel house, one on top of the wheel house and one at the after steering station. A Sperry gyro-pilot is also installed which affords manual steering electrically as well as automatic steering. The magnetic compass was supplied by the Kelvin and Wilfrid O. White Company, Boston, Mass., and is the genuine Lord Kelvin type standard compass and binnacle. The steering compasses are the Kelvin-White special underlighted spirit type in full compensating binnacles. A motor-driven sounding machine of the Kelvin type, capable of taking soundings with vessel at full speed, is also installed.

The Kolster radio compass installed in the chart room represents the latest development in radio direction finding apparatus, among its features being the new visual bearing indicator, which enables the user to take bearings by means of sight as well as by sound. The indicator, which consists of a small lamp mounted on the radio compass at about the height of the user's eyes, flashes the characteristic signal of the beacons or transmitting station. By observing the "dead zone" of the lamp, bearings may be read on stations up to approximately 25 miles distant. The visual device also acts as

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a "watchman" to indicate when a radio beacon commences operation or to indicate the close proximity of other vessels equipped with a mobile beacon.

The wireless equipment, supplied by the Independent Wireless Telegraph Company, New York, consists of a 5-kilowatt continuous wave transmitter with the motor generator operating on 230 volts direct current. The receiving equipment is of the conventional commercial type with detector and two stage amplifier. Loud speakers are provided in each lounge. In addition to all of the auxiliary equipment and safeguards which have been taken to prevent any interruption of communication regardless of circumstances, a ½-kilowatt emergency transmitter has been installed to operate from either the auxiliary storage batteries or the emergency generator.

The mechanical engine room and docking telegraphs were supplied by Chas. Cory and Son, Inc., as well as lamp type, auxiliary electric telegraph signal indicators. There is also a Cory electric whistle control for automatic and at-will operation. For communication to all navigation control stations a Cory anti-noise, 8-station telephone system is provided.

Two 18-inch Sperry 1,000-watt searchlights are located on top of the wheel house.

An electrical rudder indicator is located in the wheel house and a voltmeter type shaft revolution speed indicator is located in the wheel house and engine room for both shafts.

Ventilation

Ventilation is provided by both natural and mechanical means, the natural ventilation being similar to that in most ships of this class. Navy type cowls are used which supply air to the staterooms, public spaces and firerooms in conjunction with the mechanical system.

The mechanical ventilation is divided into 4 general groups, but all systems are operated by General Electric motors driving Sturtevant fans. The main hull is ventilated by 27 fans operating on the supply and exhaust system whose capacities are as follows:

Number of fans	Capacity, cubic feet of air per minute
2	2,500
3	4,000
5	5,000
10	6,000
2	8,000
1	20,000
4	30,000

The exhaust system is used from toilets, baths, smoking rooms and galley, while the supply system ventilates the staterooms and public spaces, crew's quarters, engine room and refrigerated spaces.

Fire Protection

A Foamite fire extinguishing system is provided in the boiler rooms. In the passenger quarters, in addition to fire screen bulkheads and the necessary hydrants and hose connections a complete Cory combined electropneumatic and manual fire detection and alarm system is provided. In all cargo holds and storage spaces a Rich smoke detection system, supplied by Walter Kidde and Company, New York, is installed with the detecing cabinet in the wheel house. A steam smothering system is also provided for the cargo holds.

Interior Communication

A Cory 16-station intercommunicating telephone system is installed for the ship's service. Chas. Cory and Son, Inc., also installed the stewards call fixtures and the watertight bells and buzzers required for this system.

A very complete electric clock system has been installed by the Magnetic Clock Company, New York.

Auxiliary Electrical Plant

Current for lighting and auxiliary power purposes is supplied by four General Electric 500-kilowatt, 240-volt, direct current, geared turbine driven generators. The turbines operate on the same steam conditions as the main turbines.

Two condensers are provided for the four sets and provision is made by means of suitable valves, so that either turbine can operate, with the other shut down, or both turbines on each condenser. Each condenser has 2,800 square feet of cooling surface, using 1,644 "blackskin" finish admiralty tubes, each ¾-inch in diameter, supplied by the British American Tube Company, Inc.

Each auxiliary condenser is provided with a motor driven, 12-inch Warren single stage circulating pump, having a capacity of 3,600 gallons per minute, with a head of 25 feet. The motors are rated 30 horsepower, 675 to 900 revolutions per minute, 230 volts.

Three 2½-inch Warren 2-stage auxiliary condenser condensate pumps are provided, one as a standby. These pumps are motor driven, with a capacity of 115 gallons per minute, and a head of 60 feet. The motors are rated 7½ horsepower, 1,200 revolutions per minute, 230 volts.

Each auxiliary condenser is also provided with a set of radojet 2-stage air ejectors, similar to those on the main condenser, supplied by the C. H. Wheeler Manufacturing Company.

Each of the 500-kilowatt, 240-volt generators is provided with two collector rings which, in connection with stationary compensator coils, give the neutral of a 3-wire, 120 to 240-volt circuit. This 3-wire circuit is used only with the particular 500-kilowatt auxiliary generator that is employed for excitation of the propulsion units. The switching of these auxiliary generators is so arranged that only one can be used for excitation at a time, while the remaining three can be run singly or in parallel, but only as 2-wire, 240 volt machines for auxiliary power.

For normal sea service operation, two 500-kilowatt generators are used in the day time and one during the quiet hours of the night. Three generators will take care of the overload conditions, leaving one set for use as a standby.

The lighting of the vessel is arranged for 115 to 230-volt, 3-wire, direct current. Two rotary balancers are provided to derive the neutral. Each balancer has a capacity of 300 amperes in the neutral. For all normal conditions, only one balancer will be required, but the two balancers can operate in parallel, if necessary, for periods of overload.

Two 15-kilowatt 120 to 240-volt direct current General Electric emergency generators located on boat deck are driven by two Mathews 30 horsepower gasoline engines. A storage battery is also located there for radio and emergency lights.

Main Switchboard

A large switchboard handles the auxiliary power and lighting circuits. Located in the engine room, this is 28 feet 6 inches long and is made up of four generator panels, one 3-wire balancer panel and seven distribution panels.

This switchboard has 43 power circuits, 13 lighting circuits, 4 propulsion excitation circuits and several additional spare circuits for future use.

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The four 500-kilowatt, direct current generators are connected to the switchboard circuits through selective switches which are so mechanically interlocked that, at any time, only one of the generators can be used for propulsion excitation. The remaining three generators can be operated singly or two or three in parallel for auxiliary power and for lighting. Most of the auxiliary motors are so connected that they can be connected either to the excitation bus or to the auxiliary power bus. All auxiliary motors operate on 230 volts. The lighting circuit is rated 115 to 230 volts, 3-wire. The propulsion excitation circuit is rated 115 volts with arrangements provided for using 230 volts on the propulsion generators during short periods while maneuvering.

There is also an emergency switchboard for standby lighting and some motor power; this is a reserve in case of failure of power in the engine room, and will handle power from the emergency generator, all of which equipment is located on one of the upper decks well above the waterline.

Refrigerating Plant

The *California* is provided with an unusually large amount of refrigeration space, namely, 60,000 cubic feet of cool air space, and 40,000 cubic feet of frozen cargo space. The cool air space is principally used for conveying California fruits, while 18,000 cubic feet of the frozen cargo space is for ship's purposes, and the remainder for cargo. The equipment consists of four Brunswick-Kroeschell Company CO_2 3-cylinder compressors, each driven by a General Electric 100-horsepower, 250-volt, adjustable-speed, 250 to 325 revolutions per minute, direct current motor, governed by manual control. There are 4 condensers and 4 brine coolers, all of Brunswick-Kroeschell manufacture. This equipment cools to a minimum temperature of 12 degrees F. to 45 degrees F. over 18,000 cubic feet of steward's stores of meats, vegetables, etc., while the cargo cold storage is cooled to a minimum temperature of 15 to 35 degrees F. for fruit and vegetables.

The air is circulated through the cold air system by 4 Sturtevant electrically driven fans of 25,000 cubic feet capacity.

For circulating refrigerating brine, there are three 3-inch single-stage, Warren centrifugal pumps each driven by a General Electric 16 horsepower, 230-volt, adjustable speed, 1,400 to 1,750 revolutions per minute, direct current motor. Each pump delivers 300 gallons of brine per minute against a head of 50 pounds per square inch. Two refrigerating condenser circulating pumps, of the single-stage, Warren 5-inch centrifugal type, are each driven by a General Electric 15 horsepower, 230-volt, adjustable speed, 950 to 1,200 revolutions per minute, direct current motor. A single-stage, Warren 1½-inch centrifugal brine circulating pump is driven by a General Electric 5 horsepower, 230-volt, 1,750 revolutions per minute, direct current motor.

The three 16 horsepower pumps are used for circulating the brine through the cooling pipes in the refrigeration rooms. The two 15 horsepower pumps circulate the refrigerating condenser cooling water (sea water). Each has a capacity of 750 gallons of sea water per minute against a head of 40 feet.

The 5 horsepower pump is used to lift refrigerating brine to the refrigerator in the steward's stores room for cold storage of refreshments. This pump has a capacity of 25 gallons of brine per minute against a pressure of 50 pounds per square inch.

Boilers

Steam is supplied at 275 pounds per square inch working pressure and 100 degrees F. superheat by 12 Babcock & Wilcox water-tube marine boilers each having 4,598 square feet of heating surface and 1,344 square feet of superheating surface, or a total of 55,176 square feet of heating surface and 16,128 square feet of superheating surface for the 12 boilers.

The boilers are arranged in two boiler rooms, each boiler room having two batteries of 3 boilers facing one another, with a common fire room. Each boiler is 24 sections wide, with 8 groups of four 2-inch tubes over one 4-inch tube per section, the tubes being 10 feet long. The boilers are equipped with Babcock & Wilcox feed water regulators. Each boiler is equipped with 7 diamond automatic "valve-in-head" soot blowers, 5 of these cleaning the boiler proper and the remaining two cleaning the superheater. Calorizing, a General Electric Company patented heat resisting process for steel, protects the elements located in the superheater and at the top of the first and second passes.

Each boiler is equipped with four Peabody mechanical atomizers and oil burners, making a total of 48 burners. Each boiler is fitted with a double front or windbox so that the burners may be operated under forced draft which is supplied by 4 Sturtevant multivane fans of 34,000 cubic feet per minute capacity each, driven by General Electric motors rated 24 horsepower, 310 to 575 revolutions per minute, 230 volts.

The fuel oil bunker capacity of 5,349 tons is sufficient for the vessel to make a round trip from New York to San Francisco without refueling. The arrangement of the fuel oil tanks is shown on the general arrangement plans. Each tank is equipped with a Pneumercator gage (there being 16 in all) which measures the oil in the tanks in depth and also in gallons. The fuel oil system includes 6 Todd 300-degree F. heaters; Worthington vertical simplex steam double acting fuel oil transfer pumps, 12 by 14 by 18 inches; and Worthington vertical simplex steam double acting fuel oil service pumps, 9 by 6 by 15 inches.

The main boiler feed pumps are of the Worthington 5-inch, 3-stage centrifugal type, driven by Sturtevant turbines. Kept within moderate speed limits of 3,200 revolutions per minute, each of these pumps is capable of delivering 300,000 pounds of feed water per hour against a discharge pressure of 400 pounds per square inch. The engine room auxiliary feed pumps are Worthington vertical simplex double acting pumps, 21 by 14 by 27 inches.

In the firerooms Worthington auxiliary reciprocating feed pumps, handling smaller volumes of water, are provided. These are of the vertical simplex double acting type, 14 by 10 by 18 inches.

The feed water system also includes one Griscom-Russell multi-screen filter and 3 single Davis Paracoil heaters, capable of heating 230,000 pounds of water per hour from 100 degrees to 230 degrees F. Two of these heaters, working in parallel, use steam bled from the main turbines, and the third receives the feed from the other two and used auxiliary exhaust.

Propelling Machinery

The main power plant consists of two marine type General Electric steam turbines, each rated 6,750 shaft horsepower, 2,640 revolutions per minute, the latter corresponding to approximately 110 revolutions per minute propeller speed. Each turbine has a maximum capacity of 8,500 shaft horsepower, 2,880 revolutions per minute

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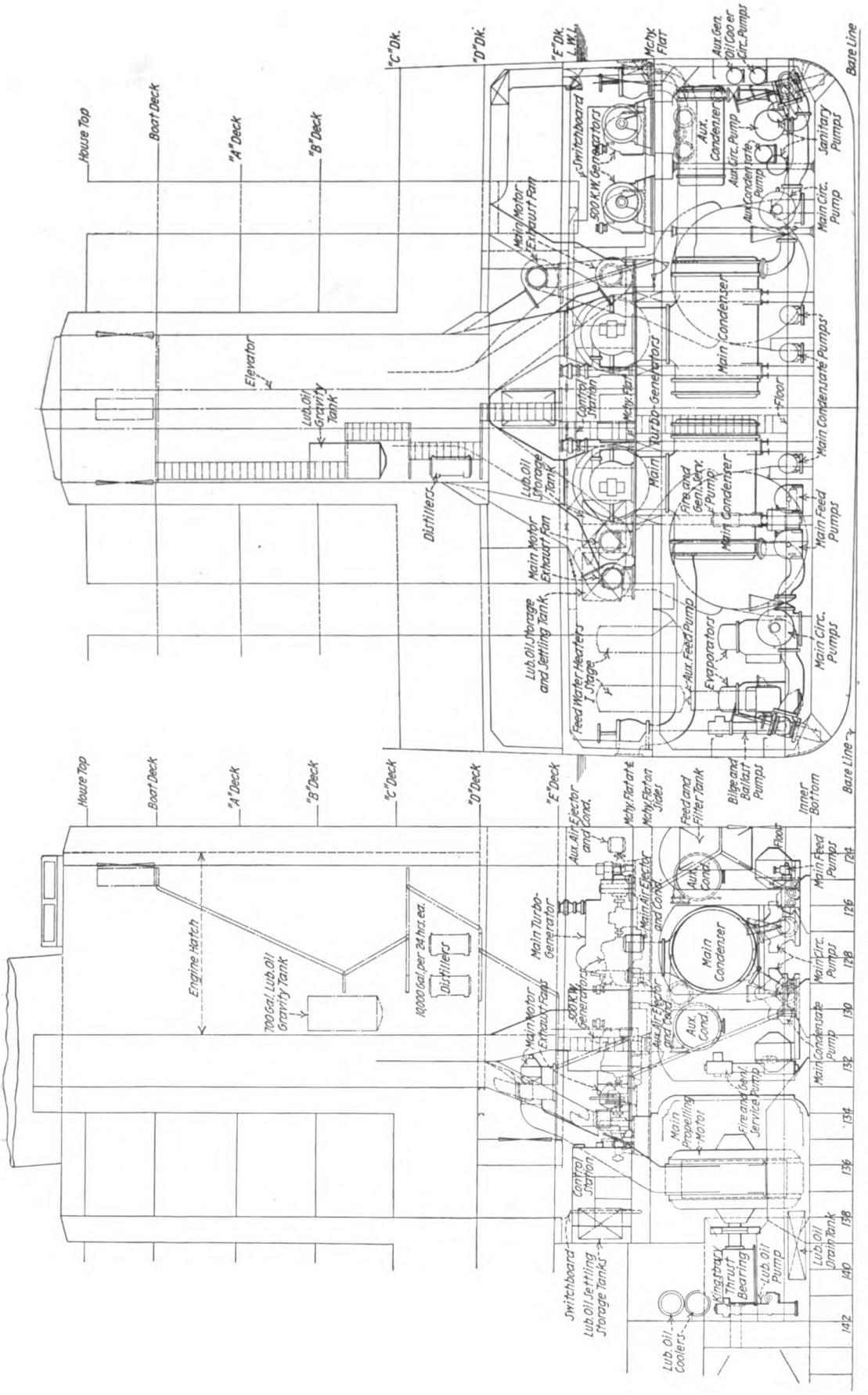

Transverse section through engine room, looking aft

Longitudinal section through engine room, looking to port

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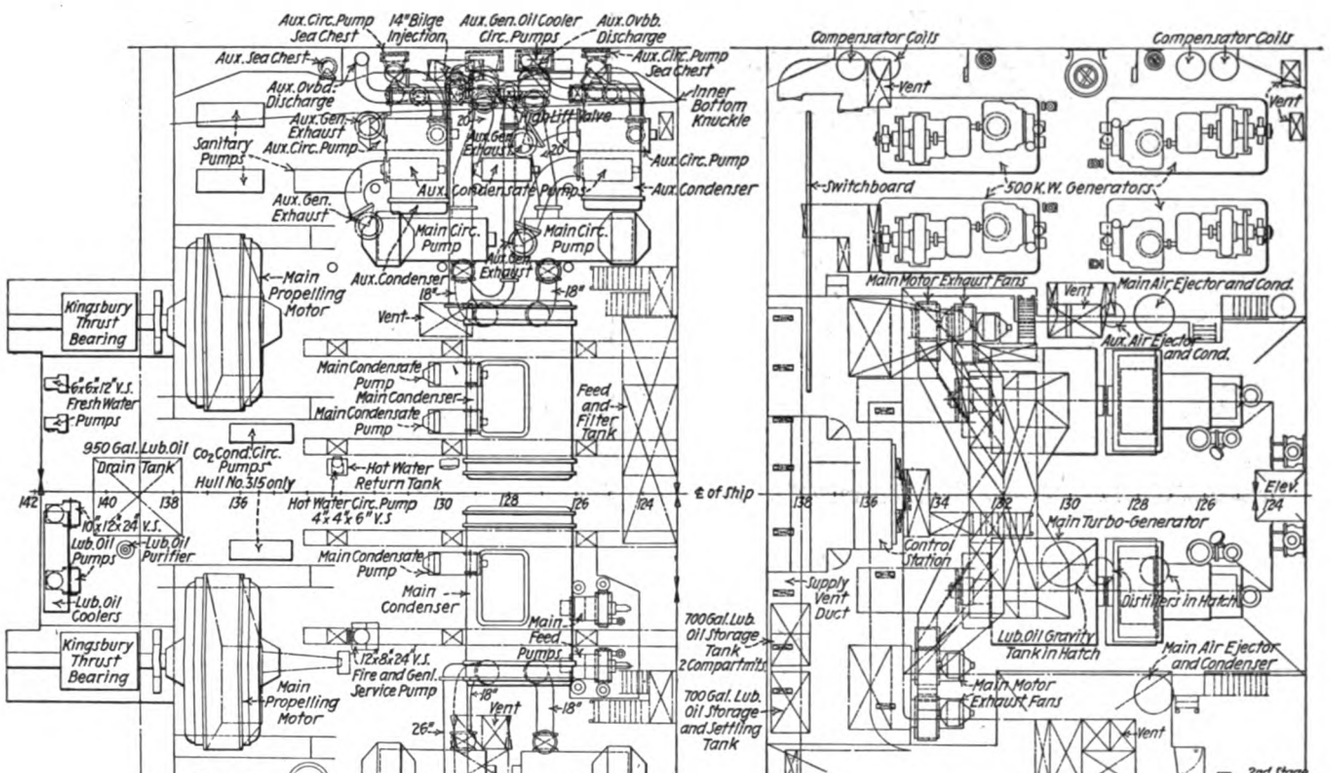
(120 revolutions per minute propeller speed). These turbines are each direct connected to an alternating current generator rated 5,250 kilowatts, 2,640 revolutions per minute, 3,700 volts, 3-phase, and having a maximum continuous rating of 6,600 kilowatts, 4,000 volts.

There are two main propelling motors, one direct connected to each propeller shaft and each being of the induction synchronous type, rated 5,250 kilowatts, 110 revolutions per minute, 3,700 volts, 3-phase, (6,750 shaft horsepower). The maximum continuous rating of each motor is 6,600 kilowatts, 120 revolutions per minute, 3,700 volts, (8,500 shaft horsepower).

Each of these motors under normal operation is electrically connected to its particular turbine generator, the contactor cell which houses the various contactors that open or close the main alternating current propulsion circuits and the direct current field circuits of the propulsion generators and motors. The panel carries the various indicating ammeters, voltmeters and wattmeters, and also the main steam pressure and vacuum gages, and has the set of levers for starting and stopping the propulsion motors and for increasing or reducing the speed of the propelling motors. Electric speed indicators are also located on this panel, which indicate the speed of each propeller in revolutions per minute. An additional set of these speed indicators is located in the pilot house. Since the contactor cell contains the high voltage switches and contactors, it is provided with



Plan of lower engine room

Plan of machinery flat

and independent of the other, but provision is made so that either turbine generator can furnish power to both propelling motors in parallel.

The propulsion motors are ventilated by four direct current, motor driven Sturtevant exhaust fans automatically controlled. In normal operation one fan is used for each propelling motor, delivering 17,000 cubic feet of air per minute. For maximum power, two fans per motor are used.

Each propulsion motor drives a 3-blade manganese bronze built-up propeller, 18 feet diameter by 17 feet 9 inches pitch.

The propelling machinery is controlled through a main operating control panel, which is provided with levers that operate the main alternating current line contactors and the direct current field contactors.

This control panel is located immediately in front of doors that are interlocked with the propulsion levers in such a manner that they can be opened only when the circuits are not alive.

The mechanical revolution counters used were furnished by the Cummings Machine Works, Boston, Mass., and are of the continuous rotary type having eight large numeral figures, using the same type of hardened steel star wheels as furnished by this company to all United States naval vessels. These counters have an adjustable friction drive telltale, with 9-inch dial. The revolutions can be determined by holding a watch in one hand and the telltale on zero with the other hand then releasing and stopping after an interval of 60 seconds.

Condensers

Directly under each turbine is located its condenser. No cross-over, or other exhaust connections, are led to

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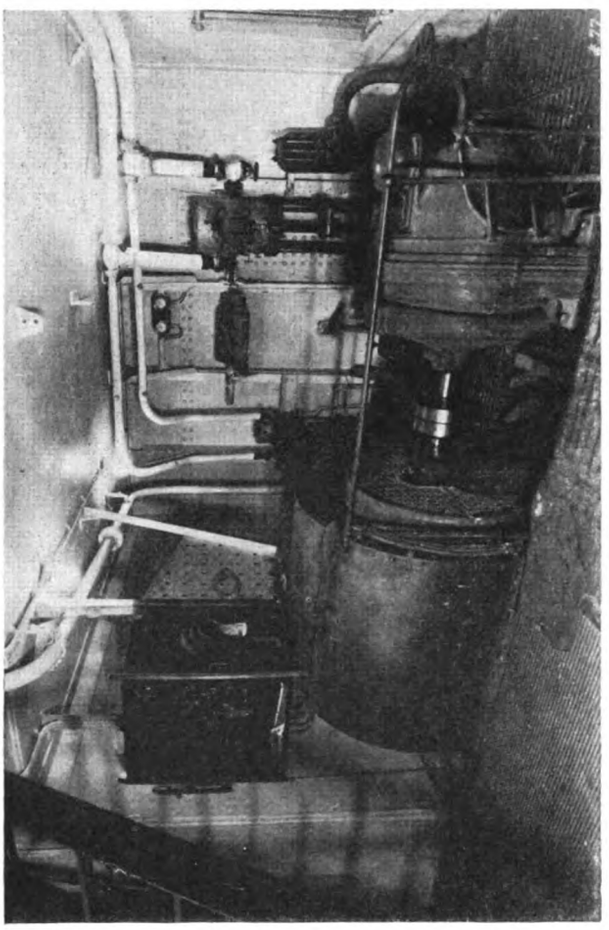
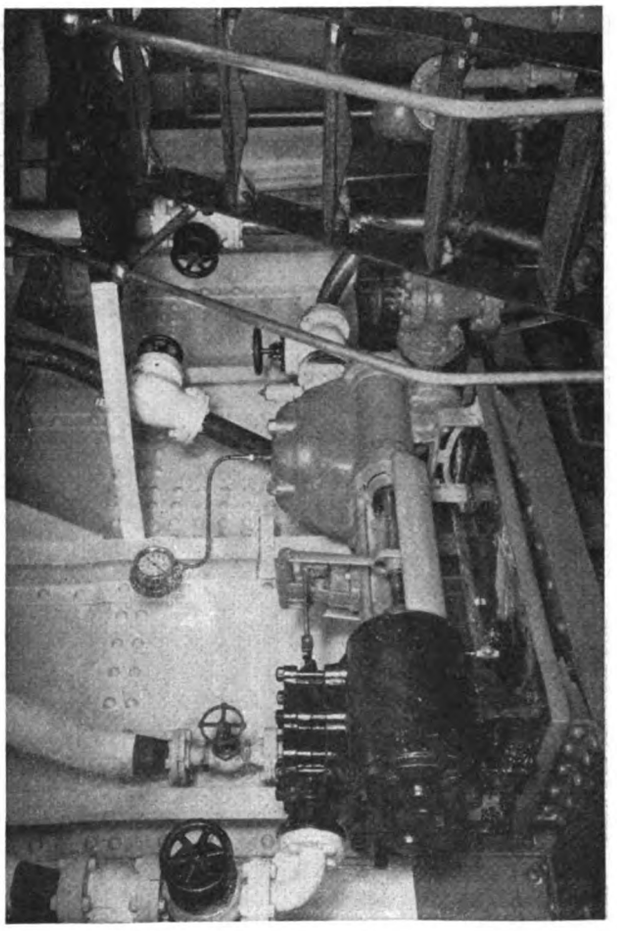
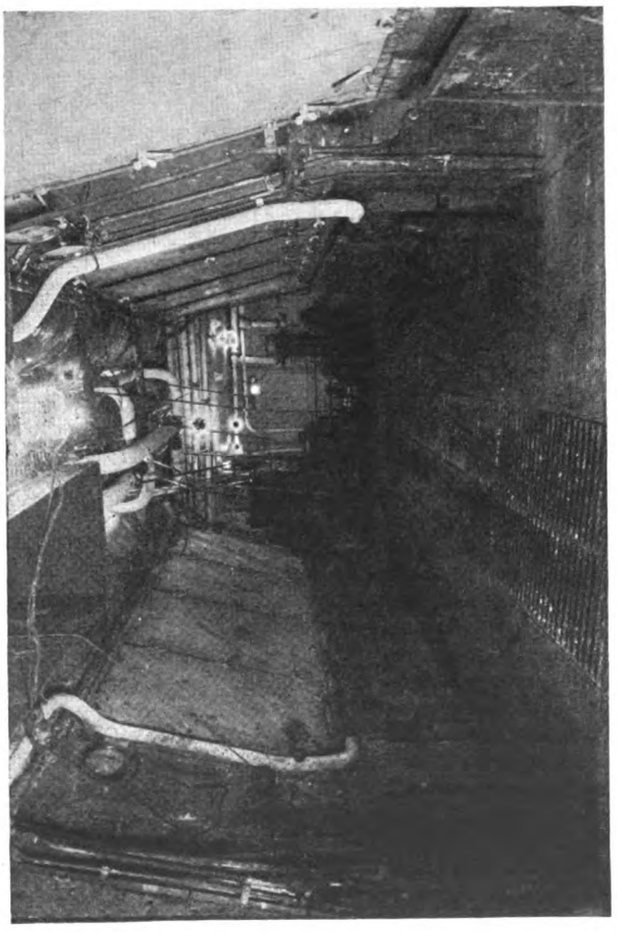


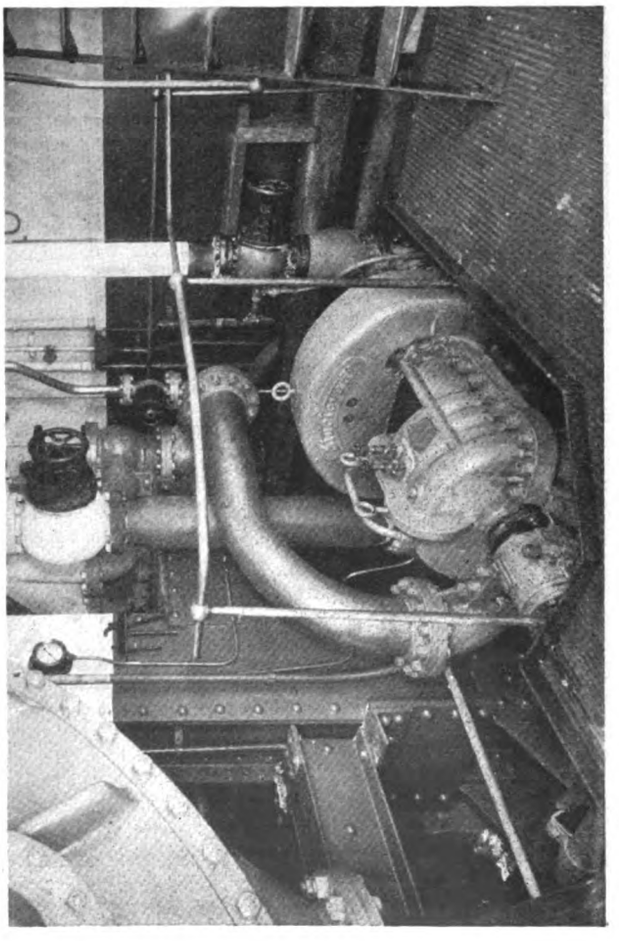
Forced draft blower



Evaporator feed pump



Boiler room



Main feed pump

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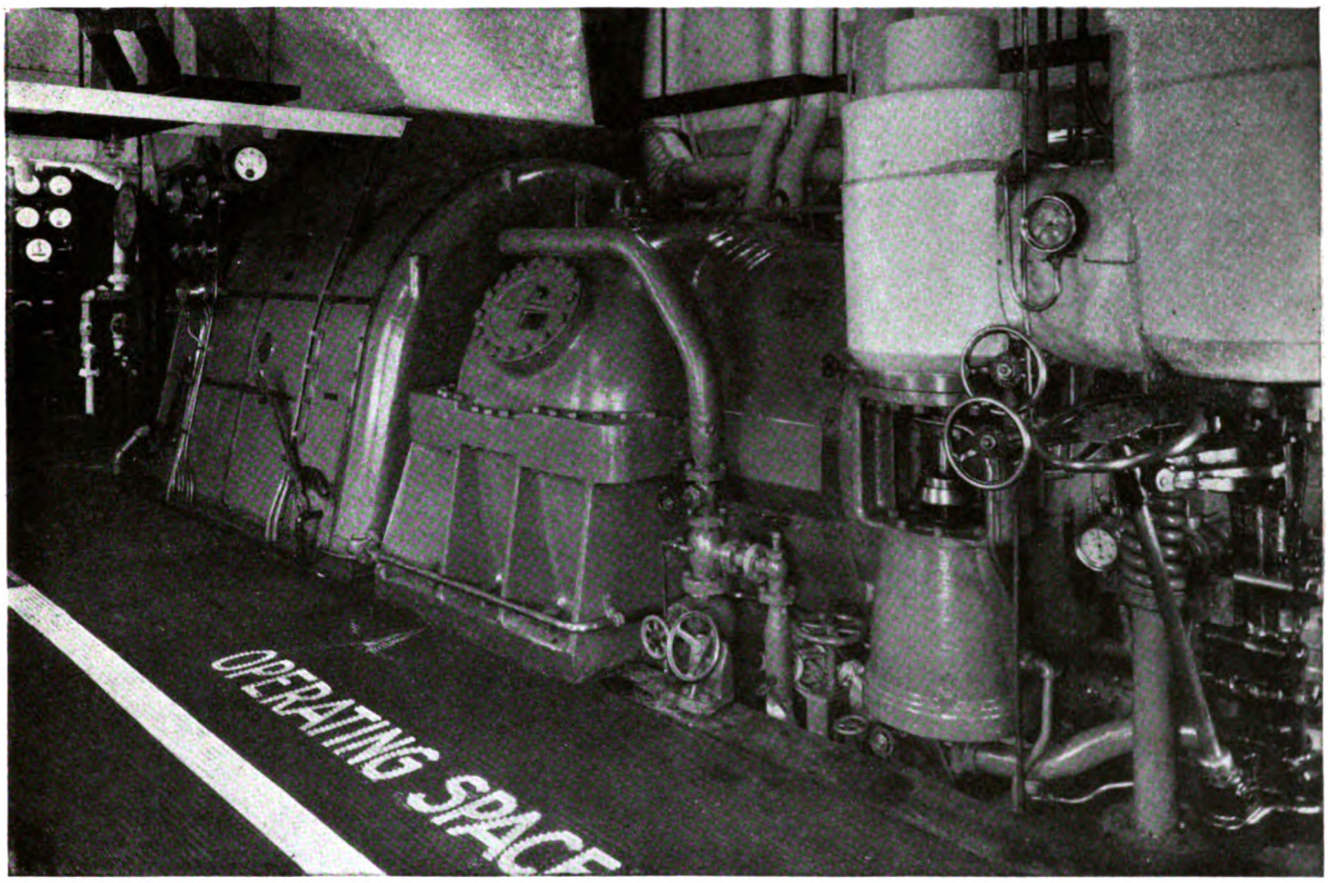
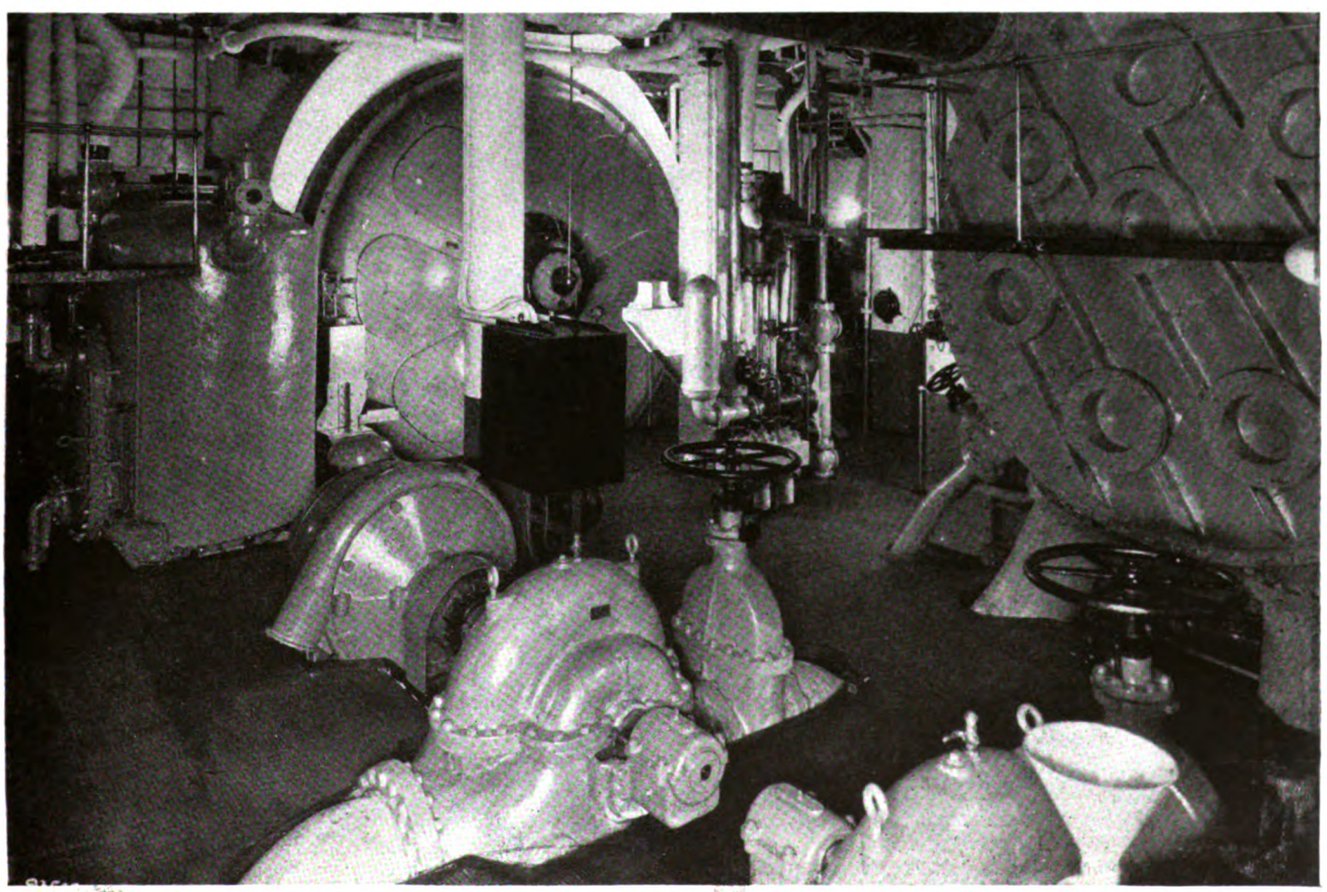


Port main turbo generator



Engine room, looking aft, showing starboard motor, evaporator (left), condenser (right) and circulating pumps

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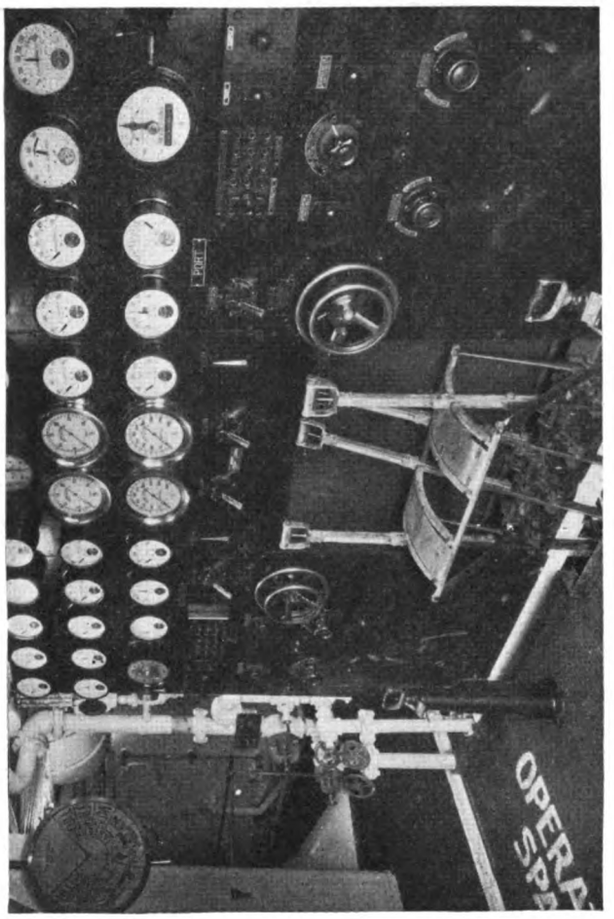
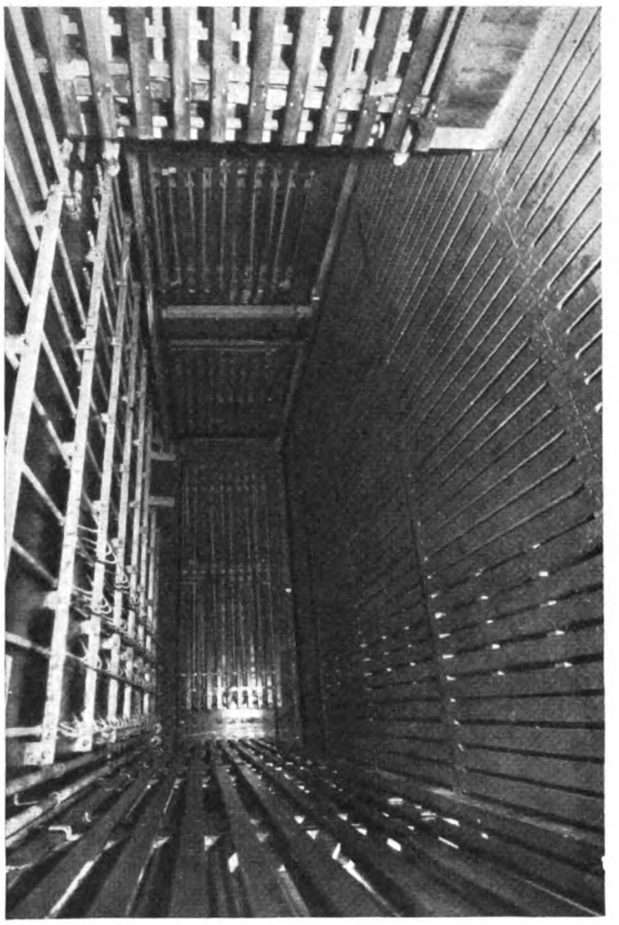
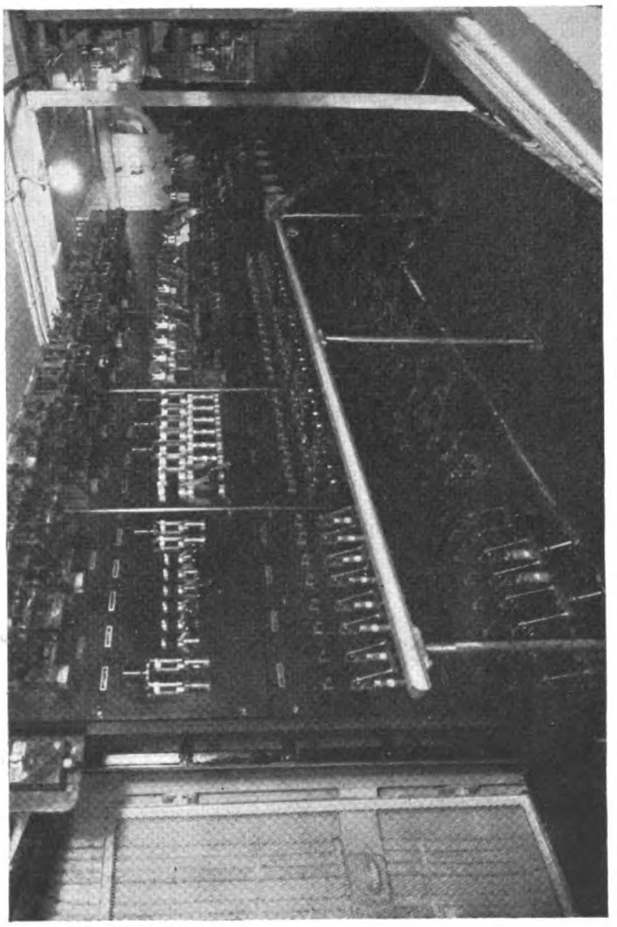


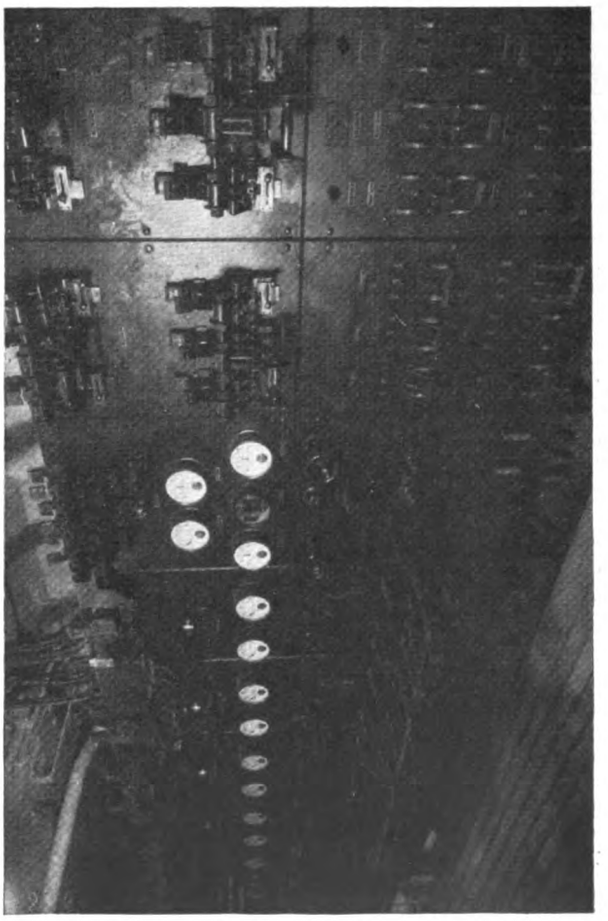
Operating station



Refrigerated hold



Main direct current switchboard



Main switchboard

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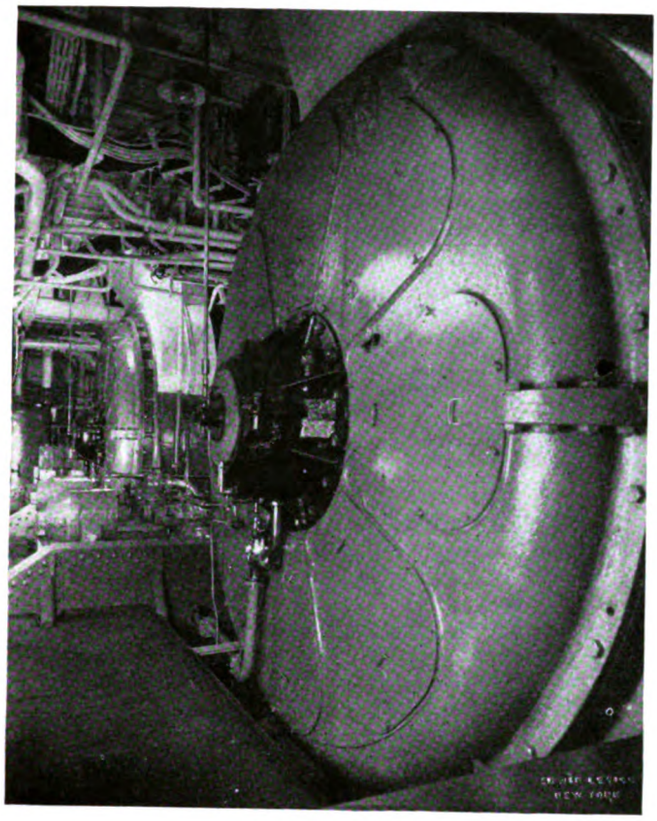
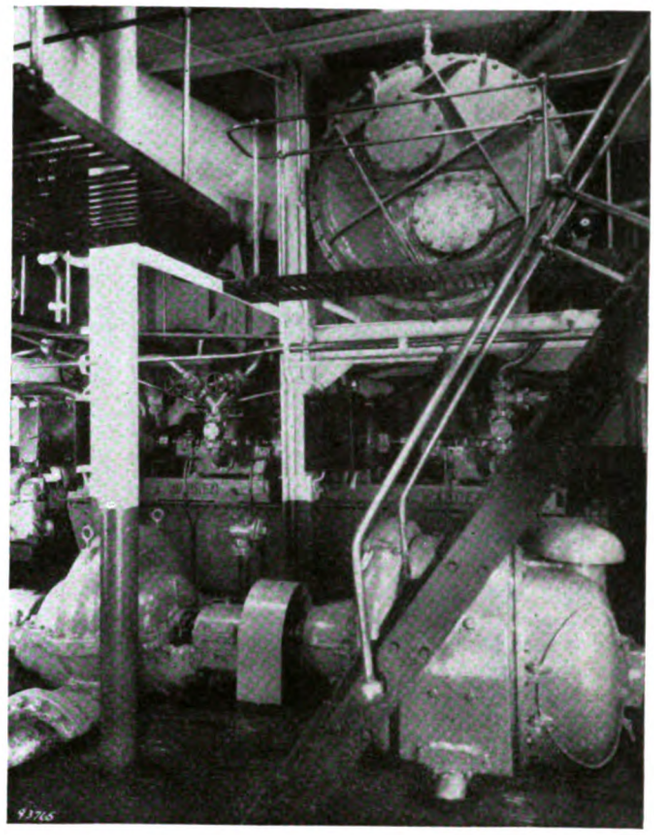
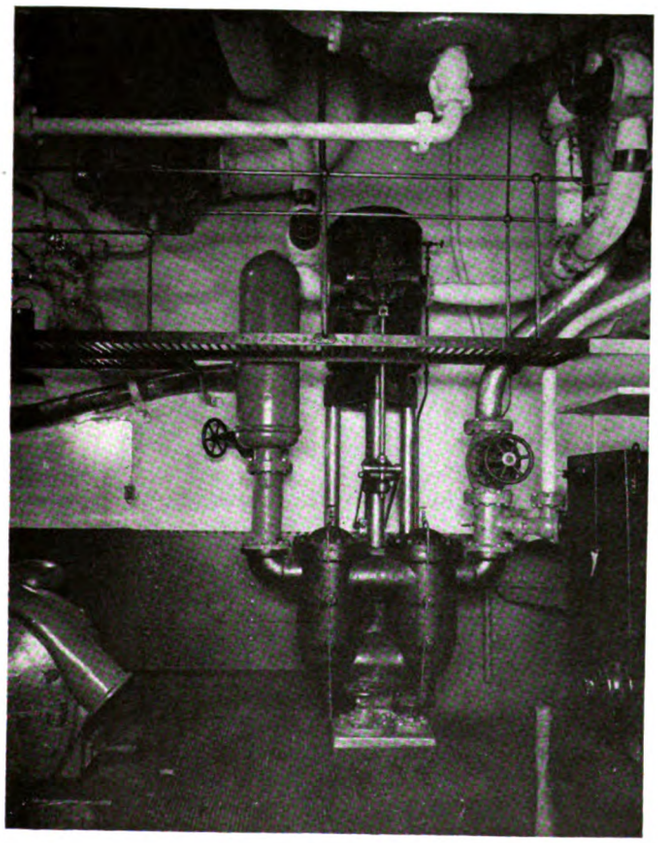


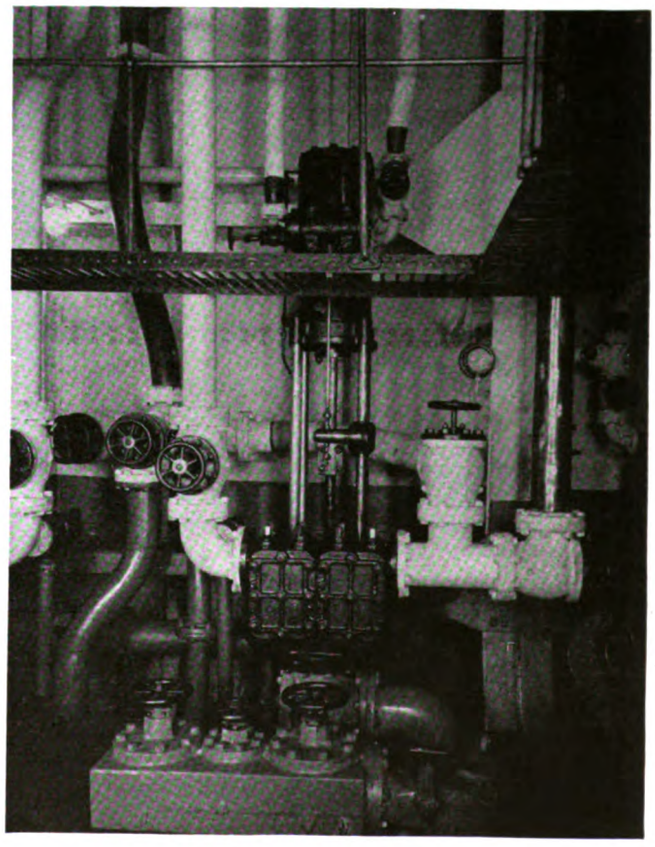
Propelling motors, looking to starboard



Auxiliary condenser and condensate pumps and main circulating pump



Auxiliary feed pump



Engine room bilge pump

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the condensers, thereby securing a minimum number of joints that have to be sealed vacuum tight and resulting in greater ease and assurance that proper vacuum is maintained in the turbine. Each condenser is mounted on accurately fitted beam springs that take care of differences in expansion, or deflection due to temperature differences, and each condenser is braced transversely and longitudinally, so as to remove under stresses on the turbine casing.

Each main condenser has 11,000 square feet of cooling surface, using 5,300 "blackskin" finish admiralty tubes ¾-inch in diameter, furnished by the British American Tube Company, Inc., and weighs 80,000 pounds empty, 96,000 pounds loaded.

There are provided for each condenser, two Warren 18-inch centrifugal motor driven circulating pumps, either one of which is capable of maintaining a sufficient flow of cooling water in the condensers to maintain the desired vacuum in the turbines for normal load. Each circulating pump has a capacity of 8,000 gallons per minute, with a head of 30 feet, and is driven by a direct current motor, rated 100 horsepower, 325 to 600 revolutions per minute, 230 volts. Magnetic control is provided for each motor, which can be set to give any suitable speed for the motor between 325 and 600 revolutions per minute.

Each condenser is provided with a motor driven Warren 3½-inch 2 stage condensate pump, which has a capacity of 210 gallons per minute, with a head of 60 feet. The motors for these pumps are rated 7½ horsepower, 1,200 revolutions per minute, 230 volts. A third condensate pump, also motor driven and of the same size and make, is provided as a standby set.

Two Wheeler 2-stage radojet air ejectors are provided for each condenser, either one of which is capable of maintaining normal conditions in the condensers, under all normal operating requirements. The radojets are of the twin type mounted on an after condenser through which the condensate from the main condenser passes condensing the steam used by the radojet, thereby absorbing the heat and obtaining the economy of hot feed water for the boilers and reducing the fuel consumption.

Auxiliaries

In addition to the condensing equipment, there are in the engine room the following motor driven pumps: 3 sanitary pumps, 2 oil cooler circulating pumps and 1 ice water circulating pump.

The sanitary pumps, of the Warren 4-inch single stage centrifugal type, have a capacity of 400 gallons per minute, with a pressure of 50 pounds per square inch. The direct current motors driving them are rated 20 horsepower, 1,500 to 1,750 revolutions per minute, 230 volts.

The circulating pumps for the oil coolers, of the Warren 3-inch single stage centrifugal type, have a capacity of 200 gallons per minute with a pressure of 25 pounds per square inch. The motors driving them are rated 7½ horsepower, 875 to 1,750 revolutions per minute, 230 volts.

The circulating pump for the ice water is a Warren 1½-inch single stage centrifugal pump which has a capacity of 15 gallons per minute, with a pressure of 35 pounds per square inch. The motor driving it is rated 3 horsepower, 1,750 revolutions per minute, 230 volts.

The engine room auxiliaries also include the following vertical simplex reciprocating steam pumps supplied by the Worthington Pump and Machinery Corporation:

Lubricating oil, 10 by 12 by 24 inches.
Fresh water, 6 by 6 by 12 inches.
Ballast, 10 by 12 by 24 inches.
Sediment, 6 by 6 by 12 inches.
Fire and general service, 12 by 8 by 24 inches.
Engine room bilge, 10 by 12 by 24 inches.
Boiler room bilge, 12 by 14 by 18 inches.
Hot fresh water, 4½ by 5 by 6 inches.
Evaporator feed (horizontal duplex), 7½ by 6 by 10 inches.

The evaporating plant comprises 3 Davis Paracoil 50-ton evaporators and 2 Davis Paracoil 10,000-gallon distillers—Paracoil steam traps are fitted.

Among other auxiliaries provided are a De Laval centrifugal purifier for purifying the lubricating oil, a Bethlehem oil separator for separating oil from bilge and ballast water and 2 Yoeman's motor driven dry-pit sewage pumps

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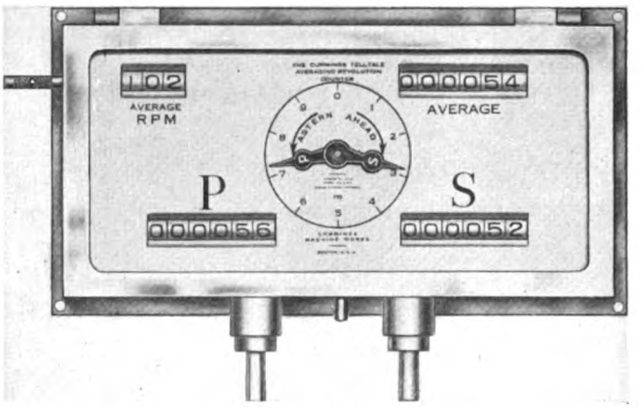
Averaging Revolution Counter

THE Cummings Machine Works of Boston, Mass., has recently developed and placed on the market a new two shaft telltale averaging revolution counter. This counter shows total revolutions for the port and starboard shafts and also the average of the two shafts. It has a two hand telltale, showing at a glance the actual performance of each shaft, ahead and astern and the proportionate speed of each.

A feature of this instrument, which is shown in the accompanying illustration, is the revolutions per minute



Cummings telltale averaging revolution counter

attachment which gives the average revolutions per minute of the two shafts. To use the attachment the counter is set to zero by turning the top knob one revolution. With all figures at zero, the lower knob is depressed for 15 seconds and the counter indicates the revolutions per minute.

In addition the instrument records the total revolutions for both directions and does not subtract when the shafts are moving in the reverse direction. The instrument is also geared outside the case to give a 10 to 1 ratio, that is 10 revolutions of the shaft for 1 revolution of the unit ring of the counter.

Naval Architects' Meeting

THE next annual meeting of the Society of Naval Architects and Marine Engineers will be held at the Engineering Societies Building, 29 West 39th street, New York, on Thursday and Friday, November 15 and 16, 1928. The annual banquet will be held at the Waldorf Astoria Hotel on Friday evening, November 16.

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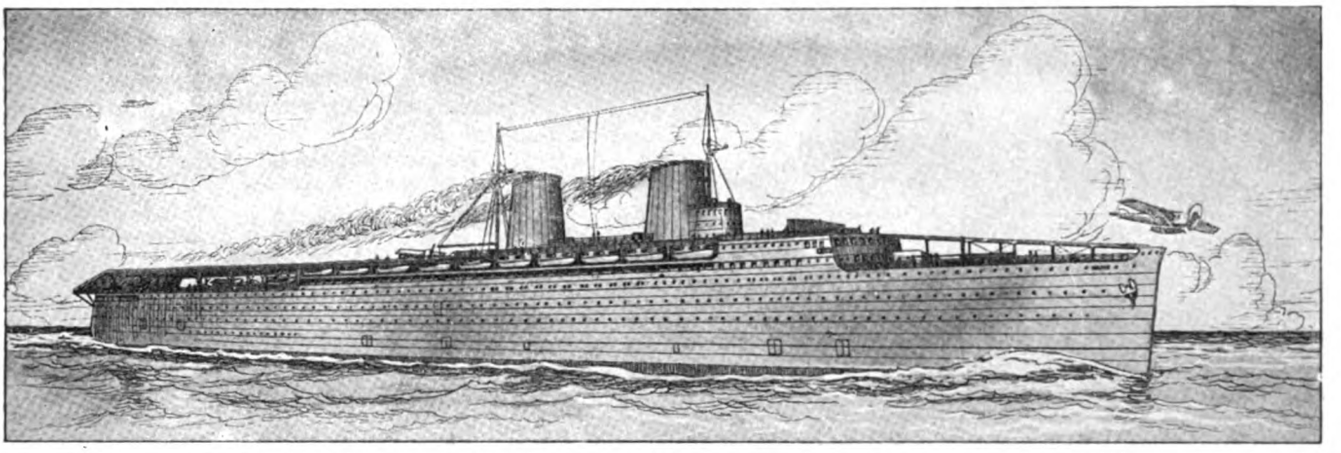

Proposed four-day transatlantic liner

Four-Day Liners for the North Atlantic

Transoceanic Corporation plans construction of six 35-knot transatlantic liners

CONSIDERABLE interest has been aroused in Washington by publicity given to a proposal by the Transoceanic Corporation of the United States, recently chartered in Delaware with a capitalization of $50,000,000, to construct six 35,000-ton liners capable of crossing the Atlantic in four days, at a cost of about $21,000,000 each, if a government loan can be obtained. The company was incorporated by Lawrence Wilder, chairman of the shipbuilding division of the American Brown Boveri Electric Corporation, and others.

A preliminary statement regarding the plan was made by Mr. Wilder before the Shipping Board on January 10, as follows:

After a careful study of American merchant marine problems, we have concluded that the American merchant marine can be re-established by intensive use of equipment, rapid turn of capital, high productivity of labor due to taking full advantage of engineering advances in power production and labor-saving devices, without a subsidy.

Our conclusions seemed to us so sound that we submitted them to several committees of the best qualified disinterested experts. The committee for the design of the ships consists of:

Professor Herbert C. Sadler, University of Michigan, Ann Arbor, Michigan.
E. H. Rigg, naval architect, American Brown Boveri Electric corporation, Camden, New Jersey.
Theodore E. Ferris, naval architect, 30 Church Street, New York City.
Dr. Elmer A. Sperry, president, Sperry Gyroscope Company, New York City.

The Committee on marine engineering and propulsion was made up as follows:

John F. Metten, formerly vice-president, Wm. Cramp & Sons Ship & Engine Company; now president, Marine Engineering Corporation, Philadelphia, Pa.
M. W. Torbet, chief engineer, shipbuilding division, American Brown Boveri Electric Corporation, Camden, New Jersey.
J. A. Burkhardt, chief engineer, Bethlehem Shipbuilding Company, Fore River, Quincy, Mass.
S. W. Wakeman, vice-president, Bethlehem Shipbuilding Company, Fore River, Quincy, Mass.
Homer Ferguson, president, Newport News Shipbuilding & Dry Dock Company, Newport News, Virginia.
C. W. Middleton, vice-president, Babcock & Wilcox Company, 85 Liberty Street, New York City.

These committees have had as consultants Sir Charles Parsons and Mr. E. H. B. Anderson, of the Parsons Marine Steam Turbine Company, which has been responsible for the design of the majority of steam turbines on the seas today and Messrs. Blache and Hallings of the Burmeister & Wain Company, who, as their licensee, have built the majority of Diesel engines now in ocean service.

The committee on operation was composed of:

J. Howland Gardner, vice-president, New England Steamship Company, New York.
T. W. Rossbottom, formerly vice-president and general manager, U. S. Lines; now vice-president, Panama Railroad Steamship Lines.
Oakley Wood, vice-president, Barber Steamship Company.

This committee has had the advice and counsel of other gentlemen of wide experience in transatlantic and coastwise operation.

The committee on the economics of the project consisted of:

Professor Simon Litman, University of Illinois, Urbana, Illinois.
Professor G. G. Huebuer, University of Pennsylvania.
Addison G. Foster, assistant traffic manager, U. S. Lines.
J. E. Slater, secretary and treasurer, American Brown Boveri Electric Corporation, Camden, New Jersey.

In addition, we have had the benefit of the advice and counsel of many important railway and traffic executives. They fully support our own original conclusions.

We have incorporated the Transoceanic Corporation of the United States for the purpose of building and operating fast, modern ships, initially for North Atlantic service, for passengers, mail, and express cargo at strictly competitive rates, and without subsidy.

Shipping Board Hearing

The plan was further outlined by Mr. Wilder at a hearing before the Shipping Board on January 24 as follows:

"We propose to build 6 ships in American shipyards capable of crossing the ocean in 4 days from dock to dock, more than 900 feet long, 90 feet beam, with a displacement of at least 35,000 tons, with accommodation for 800 passengers in greater comfort than exists on any transatlantic liner of any nationality today, and with ample space for mail and 1,000 tons of express cargo. We propose to maintain sailings three times a week from each side of the Atlantic.

"These ships will have a continuous sea speed of 33 knots and a maximum of 35 knots—substantially 9 knots faster than the present fastest liner. They have been designed as airplane carriers. The funnels and

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masts will be set to one side of the deck and the whole top deck will open and clear as an airplane landing field.

Four Requests Made

"We are here to ask the Shipping Board to declare first that this is an essential service under Section Seven of the Merchant Marine Act of 1920.

"To make our project possible, we request, second, a revision of the loan provisions of the Merchant Marine Act, so as to make possible the use of government credit facilities in the form of a construction loan of three-fourths the cost of building ships, at the Government's current rate of interest. For 6 ships, this would amount to $94,500,000.

"This loan is to be protected by prior liens on the ships themselves and will be retired in 20 years by amortization.

"We request, third, revision of the mail carrying act to establish rates not as a subsidy but commensurate with the new speed and frequency of the service, its cost, and its utility. Authority would be given to the Post Office Department to enter into ocean mail-carrying contracts for periods not shorter than 5 years nor longer than 10 years.

"Fourth, and last, because approved insurance whether here or abroad is limited on any single ship to $9,000,,000, we request protection in case of total loss in the form of cancellation of the loan against that ship to the extent not covered by amortization and insurance.

"We hope also for provision by which our crews, or a part of them, can be enrolled in the naval reserve.

Private Capital Available

"The investment from private capital of about $50,-000,000 forms a part of our plan and we have received assurances from entirely American sources of sufficient financial support to warrant us in making our proposal. This is the first time in more than 50 years that private American capital in any important amount has come forward to advance America's prestige and safety at sea.

"We submit that the government will by this loan have at its service 6 fast gigantic airplane carriers, with crews trained in actual service at sea, for all of which the government will have expended nothing. The advance of 75 percent of their construction cost will be repaid with interest. To duplicate such powerful units for its own strictly naval use, the government would need to appropriate their full cost of construction and in addition, bear the full cost of operation and training. In time of peace, these ships will pay their own way. In time of war, they will be deadly units of our armed forces at sea. Their readiness will cost the taxpayers nothing.

"Fast ships have been built and proved practical by the Navy. We ourselves have recently completed in our yard at Camden, New Jersey, the navy's newest fighting unit, the airplane carrier *Saratoga*. She is a pioneer vessel. The research and experience gained in designing and constructing her we now propose to apply to commercial vessels.

"Foreign nations are building new ships of modern, fast design with which to compete for the North Atlantic trade. To a considerable extent they are using American capital with which to do it. They are not reconditioning old ships. If we are to be successful in maintaining an American merchant marine against them, it must be by building better ships than theirs.

North Atlantic Traffic

"Across the North Atlantic flows a stream of about 300,000 first class and cabin passengers. Nearly three-fourths of them are citizens of the United States. The fact that 12 percent of the total traffic volume is already handled by slower American ships indicates the volume that would be handled by this faster, more comfortable American service. The tendency to use fast ships is unmistakable. It has resulted in the gradual elimination of older, slower vessels and their conversion into cabin ships as a means of squeezing a few more years of productive life from them. We propose to give these passengers a better and more frequent service than any now available and at strictly competitive rates.

"Time is the essence of mail service. We offer a new frequency and speed, reducing transit time from one-third to one-half the present from dock to dock and expediting it still further by use of shore-to-ship and ship-to-shore airplane service. The importance of this economy of time to a country of such vast financial and commercial power as ours must be obvious.

"The rapid marketing abroad of from 12 to 15 percent of our excess manufacturing production is essential to our high standard of living and our continued prosperity. A tri-weekly movement of express cargoes at a speed 10 knots faster than now generally available should commend itself. In 1926 our American boats carried only slightly more than 4 percent of the 1,969,555 tons carried in combination cargo and passenger ships between United States and North and South Atlantic ports of Europe.

"Our dependence upon foreign ships is well known. We carry less than 30 percent of our production in ships of our own flag and even this percentage is decreasing alarmingly each year. Our experience should leave no doubt of the necessity of our owning and controlling the operation of the ships on which our prosperity rests.

Speed Essential for Success

"The way to begin the restoration of our merchant marine is by inaugurating a transatlantic service for passengers, express cargoes, and mail. Thus it has always been in the long history of every change of transportation. Faster means of conveyance have always been given first to passengers and mail, later to freight. The establishment on the North Atlantic of such a service as we here propose will give an impulse to the reestablishment of our entire merchant marine in every sea. Ships such as those we have designed, I venture to say, may revolutionize ocean service.

"During the war we built eight million tons of commercial ships. Since then we have built none for foreign service. But our competitors abroad since then have built also eight million tons of ships, faster and more economical than our war emergency vessels. They have eclipsed us at sea.

"Aircraft and ships have been already combined in the navies. They fit together and serve each other naturally. The commercial ships of the future are bound to make use of this new service.

"The successful operation of a passenger service at a 33-knot speed well may be followed by a 25-knot service for freight. The development by American designers of cargo ships able to load and discharge bulk freight with great rapidity should not be long delayed.

"We propose now, however, to limit our beginning to a passenger, express cargo and mail service across the North Atlantic.

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Proposed Service Essential

"That this is an essential route appears to us obvious. Excluding traffic to and from Canada, more than 70 percent of the total passenger traffic between our country and all foreign ports crosses the North Atlantic. We find that of the total volume of United States mail to all foreign ports, approximately 76,000,000 pounds, 38,000,000 or 50 percent is carried on the North Atlantic.

"Of the total exported and imported manufactured food-stuffs and semi and finished manufactures of all kinds, more than one-half are carried to or from European countries. Of this very large volume, by far the the greatest percentage represents Western European traffic. In other words, taking into account all the classifications served by this proposed line, more than half of the entire traffic between the United States and the markets of the world is carried in the North Atlantic trade. This proves conclusively the essential character of this proposed route.

Value as Naval Auxiliaries

"Our new commercial ships are airplane carriers. No foreign navy in the world owns or is building anything like them. They can maintain 33 knots for 7,000 sea miles and can go around the world at fleet speed without refueling. Their normal complement in commercial use will be 24 airplanes. In national emergency they can be quickly changed to carry almost 100 airplanes, each ready to fly. Their very high speed, their unequalled radius of action, and their striking power in the air will make them the finest navel vessels afloat in the time of emergency.

"The Disarmament Conference of 1922 does not affect them. They are ships built for commerce. Airplanes and airports are not military units, whether ashore or afloat.

"Today we are unable to protect our Pacific possessions or to aid an ally in Far Eastern waters because we have no naval stations west of Hawaii. Ships which can sail around the world at fleet speed or race for 7,000 miles at 35 knots without refueling, do not need naval bases. No merchant ship has ever been designed that more perfectly meets the requirements both of the merchant marine and the navy.

Terminals

"Intensive use of equipment on the sea requires a harbor which can be entered and left without delay. Arrangements to use the French port of Le Havre have been completed and in England the port of call will be either Southampton or Plymouth. Satisfactory cooperation from the necessary railroads of both countries is assured.

"The selection of a terminal in the United States is still an open question. It will be either on Long Island or somewhere along the coast of New England, within easy reach of New York City and served by trunk railroads. On both sides of the Atlantic special trains will be operated to shipside for convenience of passengers.

"We will gather together an operating personnel of American citizens experienced in transportation on our railroads and in our shipping, coastwise and foreign. The advice and help which we have already received from such men reveals their substantial interest in this plan.

"We are prepared with careful thought, approved designs and sufficient private capital, to make a sincere, forward-looking effort to solve the problem of the American merchant marine, with cooperation of the government but without expense to it, by building ships as much better than those of our foreign rivals as theirs are better than ours today, and by operating them in the way our packet boats and clipper ships, our great industries and our railroads, have been operated with substantial success.

"We propose nothing new. Every element that enters into our ship design and plan of operation has been tested and proved by use elsewhere. We propose only to bring these well-tried factors together into a ship in ocean service.

"We are confident that in this way a start can be made to re-establish an adequate self-supporting American merchant marine strong enough to compete with the merchant marine of the world, numerous enough to assure us transportation to our foreign markets, loyal enough to protect our exporters against discriminating rates and able to meet the needs of the nation, both in periods of normal trade and in times of national peril."

Marine Standards Committee Holds Annual Meeting

IN reviewing the progress of the work of the American Marine Standards Committee at the annual meeting, which was held at the Department of Commerce, Washington, D. C., on January 23 and 24, Colonel E. A. Simmons, chairman of the executive board, stated that 54 standards have already been adopted. Twenty-four others are in process of production and it is expected that by the end of 1928 at least 100 marine standards will have been adopted.

The American Marine Standards Committee has 330 member bodies; two active special committees, covering stability and subdivision; 3 technical committees, covering hull, engineering and operating details; 41 active subject committees and 250 participants in its technical activities. Encouraging reports are being received showing that these standards are being widely used both by naval architects and shipbuilders.

Colonel Simmons expressed appreciation of the work of the various committees, all of which is voluntary work, and especially of the cooperation of the Department of Commerce under the supervision of Secretary Hoover and of the Shipping Board, which has made it possible to carry on the work without calling upon the members of the committee for financial support.

During the meeting the work of Mr. A. V. Bouillon, secretary of the executive board, was highly commended and he received a vote of thanks for his valuable services.

The meeting consisted of two sessions, the annual meeting of the executive board on the 23rd and a mass meeting of the membership on the 24th. At the annual meeting of the executive board the officers were re-elected as follows:

Chairman—Colonel E. A. Simmons.
Vice Chairman—Captain R. D. Gatewood
Secretary —A. V. Bouillon.

In the election of the executive board for 1928 more names were proposed for membership than ever before. The following were elected:

Edwin C. Bennett, naval architect, 30 Broad Street, New York, N. Y.

Rear Admiral J. D. Beuret (CC), U. S. N., chief of Bureau of Construction and Repair, Navy Department, Washington, D. C.

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(Alternate: Rear Admiral G. H. Rock (CC), U. S. N., assistant chief of Bureau.)

Homer L. Ferguson, president and general manager, Newport News Shipbuilding & Dry Dock Company, Newport News, Va. (Alternate: Charles R. Bailey, engineering director.)

Theodore E. Ferris, naval architect and marine engineer, 30 Church Street, New York, N. Y.

Hugo P. Frear, vice-president, Marine Engineering Corporation, Steele Building, 124 15th Street North, Philadelphia, Pa.

William Francis Gibbs, president, Gibbs Brothers, Inc., One Broadway, New York, N. Y.

Edward C. Gillette, superintendent of naval construction, Bureau of Lighthouses, Department of Commerce, Washington, D. C.

Rear Admiral John Halligan, Jr., U. S. N., chief of Bureau of Engineering, Navy Department, Washington, D. C. (Alternate: Captain E. L. Bennett, U. S. N., assistant chief of Bureau.)

Dickerson N. Hoover, supervising inspector general, U. S. Steamboat Inspection Service, Department of Commerce, Washington, D. C.

Henry C. Hunter, counsel, National Council of American Shipbuilders, 50 Broadway, New York, N. Y.

Major General Edgar Jadwin, chief of engineers, U. S. A. War Department, Washington, D. C. (Alternate: Captain W. D. Styer, U. S. A., 710 Army Building, 39 Whitehall Street, New York, N. Y.)

Captain Charles A. McAllister, president, American Bureau of Shipping, 24 Old Slip, New York, N. Y.

S. D. McComb, manager, Marine Office of America, 53 Beaver Street, New York, N. Y.

Captain John F. Milliken, secretary-treasurer, Neptune Association, 82-84 Broad Street, New York, N. Y.

Robert W. Morrell, consulting naval architect, marine engineer and surveyor, 20 Broad Street, New York, N. Y.

E. H. Rigg, naval architect, American Brown Boveri Electric Corporation, Camden, N. J. (Represents The Society of Naval Architects and Marine Engineers.)

Dr. Herbert C. Sadler, University of Michigan, Department of Naval Architecture and Naval Engineering, Ann Arbor, Mich.

Joseph J. Tynan, general manager, Union Plant, Bethlehem Shipbuilding Corporation, Ltd., San Francisco, Calif. (Alternate: William Binley, Jr., naval architect, Fore River Plant, Bethlehem Shipbuilding Corporation, Ltd., Quincy, Mass.)

H. B. Walker, president, American Steamship Owners' Association, 11 Broadway, New York, N. Y.

The following were appointed as advisory members:

John W. Gray, assistant to general manager, Newport News Shipbuilding & Dry Dock Company, 410 Harrison Building, Philadelphia, Pa. *Representing The American Society of Mechanical Engineers.* (Alternate: H. H. Brown, editor, *Marine Engineering and Shipping Age,* 30 Church Street, New York, N. Y.)

C. L. Warwick, 1315 Spruce Street, Philadelphia, Pa., *representing the American Society for Testing Materials.*

Lieutenant Commander Leo Otis Colbert, Coast and Geodetic Survey, (chief of section of field work) Washington, D. C., *representing the American Society of Civil Engineers.* (Alternate: Lieutenant Commander H. A. Seran, Coast and Geodetic Survey, (chief of section, vessels and equipment), Washington, D. C.).

R. A. Beekman, marine engineering department, General Electric Company, Schenectady, N. Y., *representing the American Institute of Electrical Engineers.*

S. D. McComb, manager of Marine Office of America, 53 Beaver Street, New York, N. Y., *representing The National Fire Protection Association.*

Dr. P. G. Agnew, 29 West 39th Street, New York, N. Y., *representing The American Engineering Standards Committee.*

A. V. Bouillon, Department of Commerce, Division of Simplified Practice, Washington, D. C., *representing the U. S. Bureau of Standards.*

The following administrative committees were appointed for the Year 1928:

Organization, Membership and Finance: Colonel Edward A. Simmons, chairman; Captain Charles A. McAllister, vice-chairman; E. H. Rigg; H. B. Walker and Henry C. Hunter.

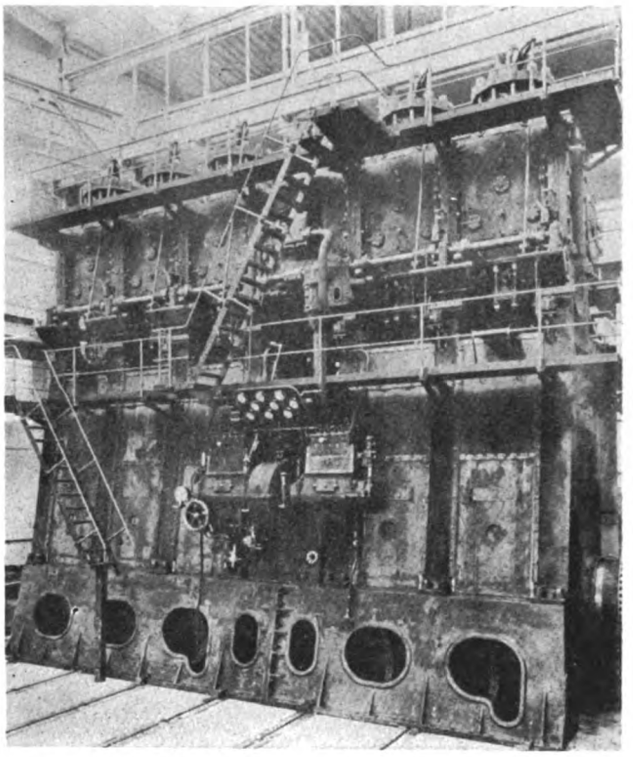
Constitution and Rules: William Francis Gibbs, chairman; Rear Admiral John Halligan, Jr., U. S. N., vice-chairman; Dickerson N. Hoover, Captain John F. Milliken and Robert W. Morrell.

Publicity and Relations: Captain R. D. Gatewood, chairman; S. D. McComb, vice-chairman; Theodore E. Ferris; Hugo P. Frear and Edwin C. Bennett.

M.A.N. Double Acting Engine of Lighter Weight

By Our London Correspondent

IT HAS frankly to be admitted that double acting, two stroke Diesel motors have not demonstrated the possibility of building marine oil engines so much more cheaply than those of the single acting class as their sponsors had hoped. The designers in most cases had claimed that it was necessary, until further experience had been gained, to give these units heavy scantlings, with the result that they weigh more and are more costly to build than will be the case within



New type M.A.N. double acting, two stroke engine of 4,200 brake horsepower built for new Hamburg American motorships

the course of a few years when the same knowledge is available concerning their operation as is now to be obtained in regard to single acting plant.

As a result of the performance of about half a dozen ships fitted with M. A. N. double acting, two stroke engines, the builders of this motor have now produced a modified design which is undoubtedly a good deal lighter and, one may anticipate, a little cheaper to build. The development is of some interest in view of the fact that M. A. N. engines have been produced in America and already installed in ships owned by the United States Shipping Board. Presumably the new design, which is now illustrated, will be taken up by the licencees in America, especially if the claims which the German firm makes are substantiated.

That a marked reduction in weight is achieved may be demonstrated from the following figures. The standard cylinder size of the M. A. N. double acting engine used in America and Germany is 700 millimeters in diameter with a piston stroke of 1,200 millimeters. Of the old design, a six-cylinder unit running at 125 revo-

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lutions per minute and developing 7,000 brake horsepower as a maximum, the weight is 450 tons, the engines of the motor liner *Augustus* forming an example.

Reduction in Weight

The weight of the new engines with the same number of cylinders and equal cylinder diameter and piston stroke, developing equal output, is 360 tons, or a saving of no less than 20 percent. This weight is equivalent to about 115 pounds per brake horsepower. Still further developments are being made by the M. A. N. Company, in the direction of the adoption of high speed and, as is known, the machinery of the 17,000-ton Hamburg Amerika Line transatlantic passenger vessels will comprise four M. A. N. double acting engines running at 115 revolutions per minute and driving the propellers through gearing. They will be of the new design and their weight will be still lower, probably in the neighborhood of 80 to 85 pounds per brake horsepower.

It will at once be noted by those who know the previous M. A. N. design that the new type represents many points of difference. The cylinders themselves are now formed practically into an entablature by bolting them together at the flanges. They are supported on "A" frames and through bolts extend along to the top of the cylinders.

Changes in Design

The cylinder covers are entirely different, and there is sufficient space at the bottom cylinder cover for it to be lowered on to the top of the crank case and removed in that position while the cylinder liner at the bottom can also be taken out in the same way. The cylinder covers comprise two portions, one a cast iron pressure piece and the other which forms the upper side of the combustion chamber and is pressed on to the liner by the cast iron piece previously mentioned.

The cylinder liner is in three sections, the central portion containing all the ports for the exhaust and scavenging, and a new system of piston cooling is devised. Instead of having four fuel valves located symmetrically around the bottom cylinder cover, there are now but two, which simplifies the valve gear considerably, and the starting air valve at the top cylinder cover has been eliminated, which again reduces the complication and the weight. It is found, apparently, that such engines will start readily with the admission of air only on the bottom side of the pistons. The arrangement of fuel pumps has, likewise, been modified, all the pumps being now grouped close to the operating position.

The first engine of the new type has just been completed, and it is to be installed in a North German Lloyd cargo liner, and all the other motors of this class now under construction in Germany are to be of the new design.

The Quigley Bitumen Gun

IN ORDER to reduce the wastage and expense experienced in the use of the mop and pail method of applying tar products and heavy fluids as a protective coating, the Quigley Furnace Specialties Company, Inc., of New York, has introduced the Quigley bitumen gun.

This gun may be used in marine work for applying bitumastic solution and enamel, floor covering of the mastic type as well as pitch for various purposes. Economies of time and labor are claimed by the manufacturers and figures are given showing that 5 gallons of material may be sprayed per minute and a surface area of approximately 125 square feet may be covered in that time.

The original Quigley refractory gun as shown in Fig. 1 has been in use for some time and has proved its worth. Its application to furnace repairs and patching of boiler walls shows what may be done in applying ma-

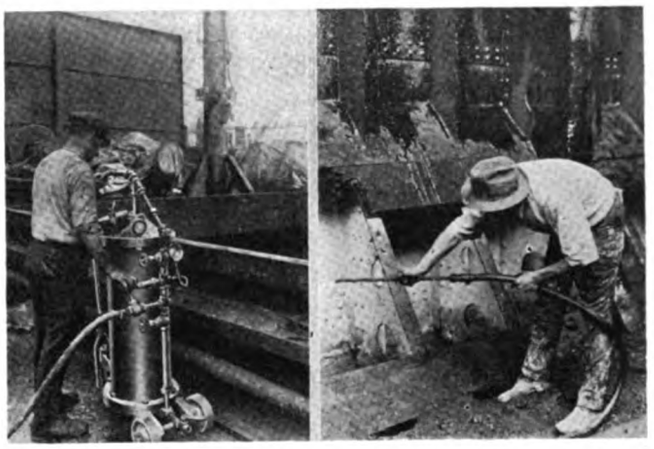

Fig. 1.—Quigley refractory gun used for applying cement in ship's hold

terial at high or low temperature where time and working conditions place hand application out of the question. The refractory gun may be used to fill cracks or holes, restore burned out walls, fill gaps in walls or arches, re-surface old walls, repair leaky or build new baffles and surface new walls. In Fig. 1 it is shown applying cement to the hold of a vessel. The gun is located on the deck of the vessel.

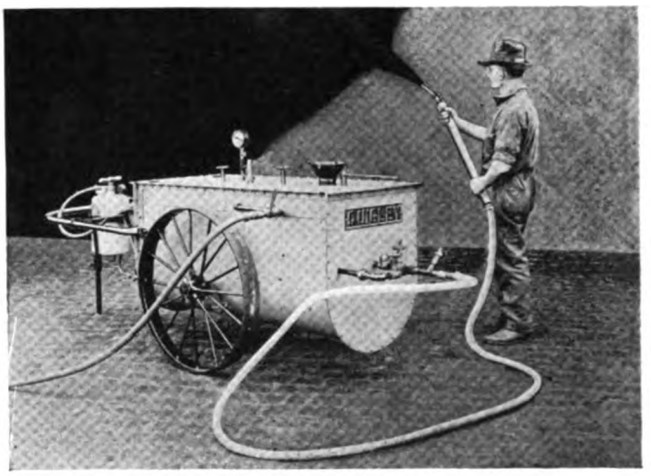

Fig. 2.—The Quigley bitumen gun

The new gun is a development of the Quigley refractory gun shown in Fig. 1 and takes the form of that shown in Fig. 2. It consists of a cast iron cylinder from which the material is forced by a piston. The gun is enclosed in a steel housing, mounted on wheels and is charged through an opening as shown in Fig. 3. The vent is closed by a quick acting valve and the opening by another which admits air pressure back of the piston. The capacity of the gun is 15 gallons.

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The compressed air does not come in contact with the material. The spray is obtained by a purely mechanical process, and nozzles suitable for various materials are provided. The gun may be operated by a small portable garage compressor or where an air line is available it may run on 15 cubic feet of air per minute at 60 pounds pressure.

Where hot material is required, the gun is loaded with the hot material and the temperature is maintained and regulated by a small self-contained kerosene burner.

Where it is not practical to place the gun aboard ship or at the point of application, a long insulated metallic hose may be used to convey the material from the gun.

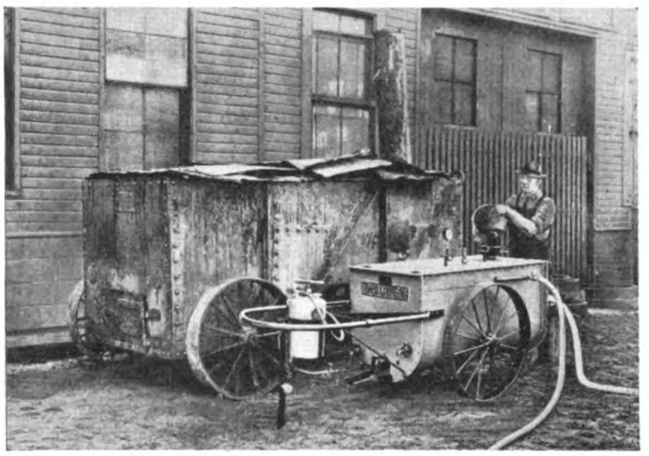


Fig. 3.—Method of loading the gun

It has been found that at normal temperatures for application the temperature of the material drops about 5 degrees F. for every 25 feet of hose.

The gun may be used for fluids of most consistencies and may be used for spraying paint, whitewash, cement and asphalt. Economies should be obtained in applying the gun to coating the exterior and interior of the hull with preservatives. Bitumastic solution and enamel for tanks and bilges may be applied to advantage.

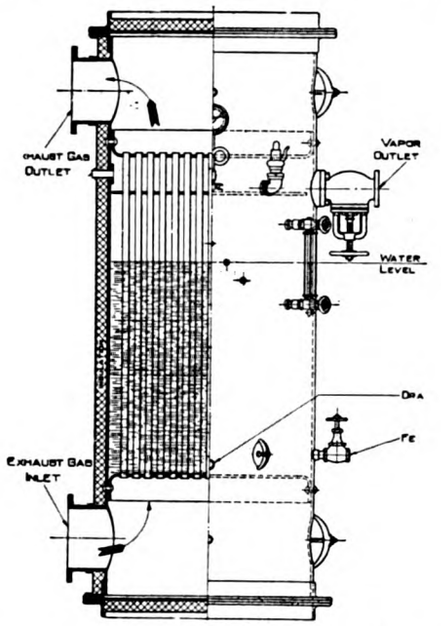
Reclaiming Waste Heat from Diesel Engines

IF British thermal units were visible, engineers probably would never be accused of wasting them. If one could see, for example, the amount of heat that escapes in the exhaust from a Diesel engine, there would be more ships equipped like Commodore Arthur Curtis James' yacht *Aloha* which is fitted with an exhaust gas steam generator for salvaging the escaping British thermal units from its Diesel engines and an evaporator and distilling plant and a hot water heater for putting them to practical uses on ship board.

Another very interesting problem that Commodore James solved in the installation of the heat saving devices was a marked increase in cruising radius that the waste heat boiler has made possible. For a merchant vessel, where cargo space instead of radius is paramount, the same waste boilers are saving actual cargo space by reducing the amount of fuel necessary to be carried for the trip.

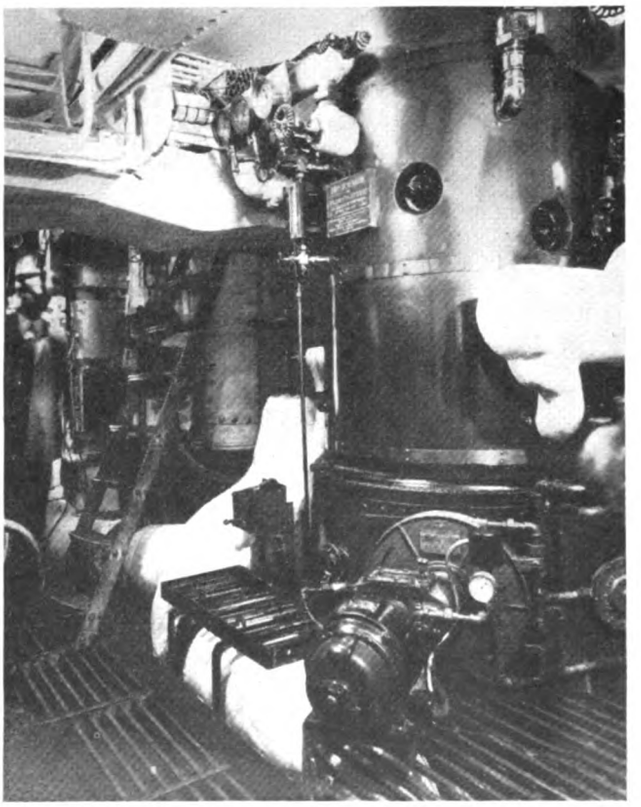
Saving Effected in the Aloha

In the case of the *Aloha* the saving was worked out as follows: The vessel has 3 main engines each of 300 brake horsepower. The exhaust gas generator installed was not designed to extract all the waste heat from the three engines as it is only occasionally that the three are operated simultaneously. During a test run



Sectional elevation of Paracoil exhaust gas steam generator

with one engine developing 235 brake horsepower (75 percent of its rating), the waste heat equipment obtained a heat extraction of 560 B. T. U. per brake horsepower hour, while with two engines running and developing 402 brake horsepower, the extraction was 530 B.T.U. per brake horsepower. The heat from only one engine



Exhaust gas steam generator on the Aloha. Distilling plant in the background

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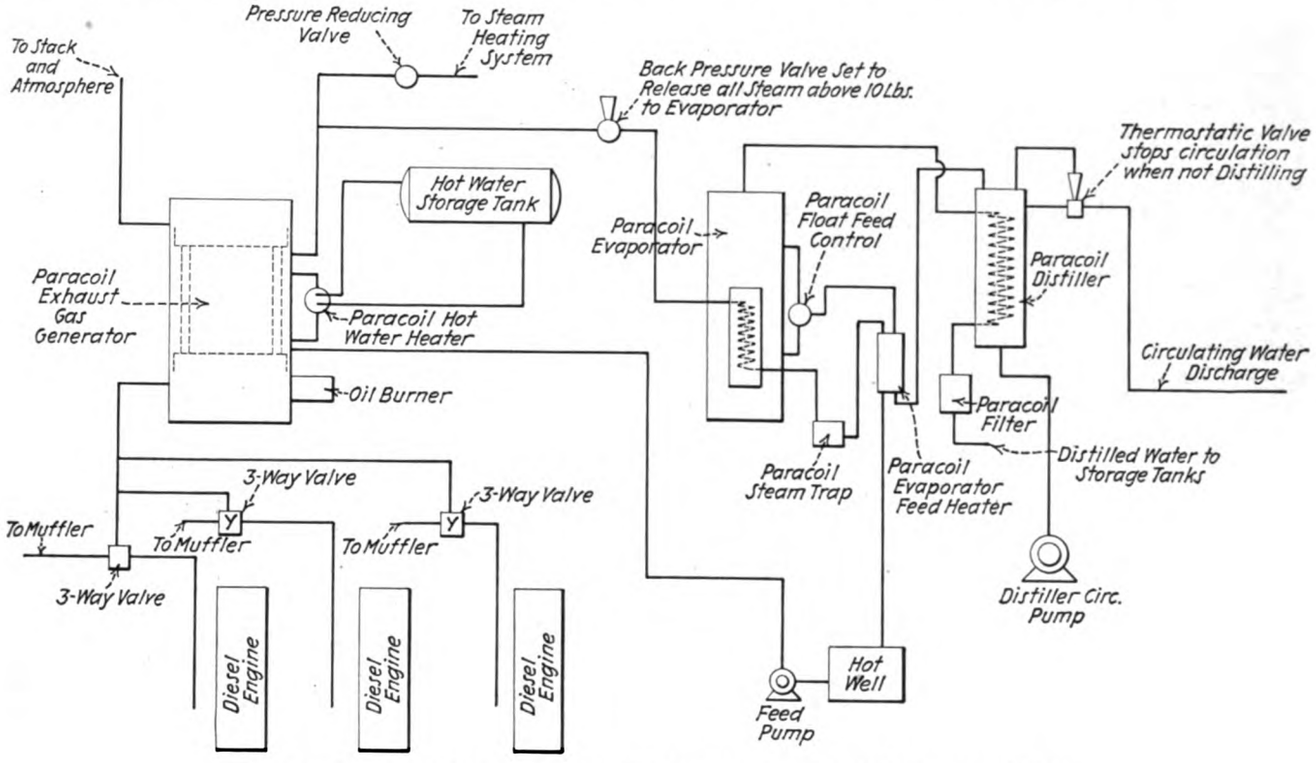
(developing 235 brake horsepower) will distill 14 gallons of sea water per hour or 336 gallons per day; or it will heat 198 gallons of water per hour for domestic purposes from 60 to 140 degrees F.; or it will supply heat for 530 square feet of steam radiation for heating the ship's quarters. It was found that the heat from the exhaust of the one main engine running at full load was sufficient to heat the quarters, supply all of the hot water necessary and evaporate an appreciable amount of sea water as well.

The daily consumption of hot water for domestic purposes per man taken conservatively is 5 gallons. For 40 men, which the *Aloha* will carry, this would require, on an average hourly rate, 5,500 B.T.U. Distilling at the rate of 8 gallons per man per day would require an hourly heat consumption for the 40 men of 126,000 B.T.U. The total heat for domestic water and distilling equals 131,500 B.T.U. per hour, which is equal to the heat extracted per hour from the exhaust of one engine developing 235 brake horsepower. It, therefore, is evident that with only one engine running at 75 percent of its full load, there is enough heat absorbed to meet the ordinary requirements and with two engines running at 75 percent load each day they would supply ample heat to meet cold weather requirements as well as furnishing hot water and distilling sea water.

The vessel carries large fresh water storage tanks so a shortage of fresh water would occur only on extremely long voyages with but one main engine in service. This can be easily overcome by operating the oil burner attached to the generator and produce in one day at least 1,280 gallons which would supply enough for 4 days on the basis of 8 gallons per man per day. The exhaust gases would produce more than 300 gallons per day so that the oil burner would not have to be run again for at least 60 days. The oil burner is used principally when the yacht remains at anchor for several days and the heat from the exhaust of the small auxiliary must be augmented by running the oil burner for a few hours.

Back Pressure Reduced

When considering the installation of waste heat boilers it is only natural to ask, "What back pressure will it produce on the engine?" As soon as heat is extracted from the exhaust gases they contract, their volume is less and their speed decreased and accompanying these changes there is a decrease in the back pressure. A muffler does no more than to change velocities, decreasing them to the point where they have eliminated the roar. But it cannot reduce the back pressure as it has no means of decreasing the gas volume.



Cycle diagram of Paracoil heat reclaiming equipment installed on the Aloha

These statements have been verified by a test made on the *Aloha*. When the exhaust was discharged through the regular exhaust line, the back pressure was 30 percent greater than when diverted through the generator.

The waste heat generator installed on the *Aloha* was of the Paracoil type designed by the Davis Engineering Corporation, Elizabeth, N. J.

The distribution of the heat in this case is performed automatically, there being installed in addition to the steam generator, a Paracoil evaporator and distilling plant, a Paracoil hot water heater and a 125-gallon copper storage tank.

The water heater is connected below the water level of the generator. This insures heating the domestic water even though no steam is generated. When at anchor there is only an auxiliary engine in operation and so the arrangement permits of absorbing all of the heat that can be extracted from its exhaust. The heater works on the principle of gravity or thermal circulation of the boiler water through the heater shell and domestic water through the tubes. A thermostat prevents overheating.

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The steam system heating is fed through a reducing valve, set so that the pressure of steam to the radiators will not exceed 10 pounds per square inch.

Steam to the evaporator is controlled by a diaphragm operated balanced valve, set so that any steam generated in excess of 10 pounds pressure is discharged to the evaporator coils. Thus it will be noted that the heating system and hot domestic water are supplied first and automatically.

The evaporator is fed through an automatic feed control. Condensing water for the distiller is controlled thermostatically, thus no water is circulated unless vapor is generated in the evaporator shell.

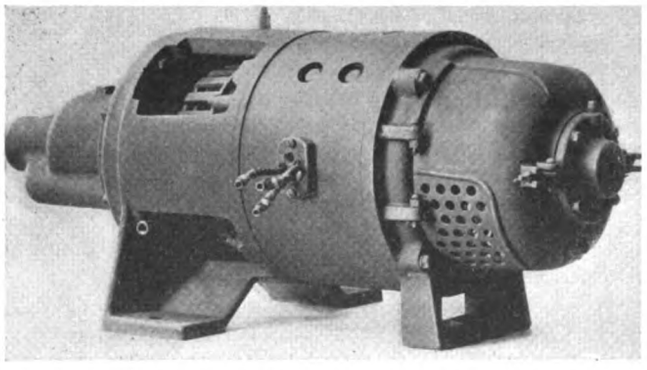
The whole system for reclaiming heat is automatic in operation and distribution as to its economic use. The cost of maintenance and upkeep is negligible.

For all those who share the responsibility for the successful operation of Diesel engines, the waste heat saving plan has tremendous possibilities along the line of true economy.

New Turbine Generator Unit

A DIRECT connected turbine generator unit having a rating of 3 kilowatts has been placed on the market by the South Philadelphia Works of the Westinghouse Electric and Manufacturing Company. This apparatus has been developed to meet the growing demand for a small, non-condensing steam turbine generator lighting set for general outdoor construction work and for marine applications. The set can be installed aboard tug boats, lighters, yachts, river craft and also for standby service in port on larger vessels. The generator coils are specially impregnated and all parts requiring weather protection are heavily sherardized.

The unit is capable of generating 3 kilowatts at 125 volts direct current when operating under steam conditions commonly encountered in its field of application. The Westinghouse re-entry type, single impulse wheel turbine is used and is overhung on the end of



3-kilowatt non-condensing turbo generator

the generator shaft. The turbine cylinder is bolted to a flange on the generator frame. The generator rotor is carried on extra large size ball bearings. The turbine rotor is a solid forging of distinctive design, in that the buckets are milled on the inside periphery of an overhanging flange which is integral with the disk proper.

The steam nozzle and reversing chamber are contained in a single block which is bolted to the inside of the turbine cylinder. The speed of the unit is regulated by a flyball, centrifugal, shaft type governor, which is carried in a heavy case bolted directly to the rotor disk.

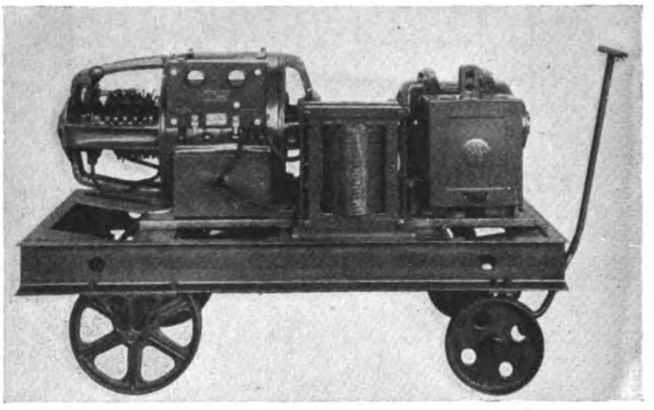
The generator is ventilated by a fan mounted on the shaft between the inboard generator bearing and the turbine casing. The air is drawn in through the front covers, then on through the generator and out of a number of openings located in the rear bracket. A suitable guard is furnished to prevent injury to the fan or to the operators of the machine.

The unit runs on two heavy single row ball bearings, each bearing being held securely to the shaft by a lock nut. Grease is used for lubrication and can be added by removing a pipe plug located over each bearing.

Single-Operator Welder

A NEW single-operator welder has been developed by the General Electric Company, Schenectady, N. Y., as the latest addition to its standard line of welding equipment. This machine includes a four bearing, ball bearing, motor-generator set with flexible coupling.

The generator is rated at 300 amperes, one hour, 50 degrees C. and the driving motor is a 15 horsepower,



Arc welder with alternating current motor drive

40 degree C., continuous rated unit. This conforms with the recent ruling of the National Electric Manufacturers Association. The generator is so designed that field control is unnecessary and is eliminated. The generator panel includes an ammeter and a voltmeter, but not the customary field rheostat. The meters used have a metal front except for the glass over the scale, thus minimizing the possibility of breakage.

The motor starters for 60 and 50-cycle motors are of the enclosed magnetic type, while those for the 25-cycle motors are enclosed resistor starters. The direct-current motors use a simple resistance starter with a line switch. Starting current is maintained in each case well within National Electric Manufacturers Association requirements.

The generator is designed to permit belt, motor or engine drive and will be designed for either stationary or portable use. It can be used as both a manufacturing and a repair tool, for service in foundries, steel mills, locomotive and car shops, shipyards, marine repair yards, tank shops, general machine shops and in any other field where iron or steel is used.

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First Voyage of the Mercer*

Details of operation of pulverized coal burning installation and discussion of future possibilities

By C. J. Jefferson†

THE first voyage of the steamship *Mercer*, from New York to Rotterdam and return, burning pulverized coal, was a continuation of the experimental work that has been carried on at the Philadelphia Navy Yard. The *Mercer* is not the last word in pulverized coal burning by a considerable margin. There will be development work continued on her and future installations will probably be quite different from the original. By the time the shipowners commence to adopt this type of fuel and build their own plants, they will have done considerable development work and within a few years we will have a standardized plant, produced by the process of evolution.

The *Mercer* is a 9,500 ton ship, built by the Federal Shipbuilding Company at Kearny, N. J. The vessel is fitted with a 2,500 horsepower General Electric turbine, three Scotch boilers and such other auxiliaries as are usually found in a cargo ship of her size. Among other things she has a wartime stack, which means the shortest stack possible in order to keep down visibility under war conditions. As we have been operating these ships, we have raised the stacks on practically all of her sister ships. With the short stack in a beam wind no difficulty occurs, but with a head wind, inasmuch as the top of the stack is on a level with the hurricane bridge, the wind carries the soot from the boilers down to the after deck.

The temperature of the stack gases, at the base of the air heater at no time was greater than 520 degrees F. By the time the gases left the air heater and superheaters they were generally down around 380 or 350 degrees F.

The vessel was bunkered with ordinary North Atlantic range fuel, containing a much larger percentage of slack than could be handled on grate bars. The fuel analysis show 14,200 British thermal units, about 7 percent ash, about 1½ percent sulphur—good bunker fuel but not exceptional.

When we arrived at Rotterdam we checked up the bunkers and saw we had enough to come home with, but it was decided to take on about 300 tons of Rotterdam coal to experiment with on the way back. When the *Mercer* arrived in New York, I asked how the Rotterdam coal worked. The report was given that the staff could not make as much steam with it as with the other coal. Apparently the boilers could not be forced as with American coal. The idea comes to my mind that probably it could not be pulverized as well as American coal. I have received an analysis from the laboratories that this coal had a content of 12,400 British thermal units. The ash content was 14 percent; there was 3½ percent sulphur.

It is therefore quite apparent why the boilers could not make as much steam with it as with American coal. It would, therefore, seem advisable for ships that are bunkering at all ports of the world, after running into such fuel as we took on at Rotterdam, to be prepared to use full boiler power.

On the *Mercer* we used only 2 boilers for the entire voyage. We had a sailing schedule mapped out which was being met by the sister ships and which was beaten by the *Mercer* by 36 hours. This she did with 2 boilers and she did it with high percentage of poor coal.

The question of whether or not the slow speed pulverizing mill would operate in a seaway was an open question when we sailed. I am prepared now to say that the slow speed ball mill will function at sea satisfactorily, even with as great a roll as the 36 degrees experienced on this voyage. The samples that we collected on this voyage show practically the same degree of fineness that we attained at the test plant.

On this initial trip there were mechanical difficulties which are to be expected on new installations. All these defects as they arose were corrected. That is why the *Mercer* was able to sail out on pulverized coal, sail across on pulverized coal, dock with it, and repeat the performance homebound, because the things that did arise were not big enough to prevent the ship's force from taking care of them.

I do not think it advisable to give fuel figures on what we did. I think it would be misleading. An initial, experimental voyage of this sort cannot be taken as a criterion of what can be done. I will say this, however, that we gave figures in a paper which were presented before the Society of Naval Architects that have been equalled and bettered on this voyage. After this vessel has been in service 3 or 4 voyages, maybe then it will be time to say what she can do regularly.

I feel that within a comparatively short time there will be a number of pulverized coal jobs afloat from which this operating data can be reliably obtained. If these installations are not put in by you people they are going to be put in by others. The Germans, the Dutch, the British are going ahead with it. I hope that enough pioneer instinct exists in our American shipowners to go ahead with something that has been started. It has been started but not finished. I trust that the Shipping Board can carry on its experimental work by an enlarged program. I have hopes that this will be done, but as I have already stated, the final plant, the plant that is going to be accepted as the standard for cargo carriers and later for passenger boats, is going to be the plant that will be evolved from the installations that you gentlemen will make with your own money.

Discussion

CHAIRMAN BENNETT: What effect is the installation going to have on the fireroom personnel?

C. J. JEFFERSON: Regarding personnel; this type of vessel generally has 9 firemen and either 3 or 6 coal passers, depending upon bunker arrangements. The bunker arrangement on the *Mercer* is not too good. There are several places where we have to carry coal through watertight doors which are simply openings, 18 inches by 3 feet 6 inches.

* Abstract of address made before the technical committee of the American Steamship Owners' Association, New York, January 9, together with the discussion following the presentation.

† Head of the fuel conservation section of the United States Shipping Board.

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On the *Mercer* we carried 3 coal passers and 3 firemen. All 6 of these men have signed on for the next voyage. The type of man you get in the fireroom generally does not sign on for the next voyage; they are through, they are going to take another job or something of that sort. On the *Mercer* they all came up and signed on without anybody saying a word to them. They said they liked the job and they were going to stick by it. They have been through the experimental voyage, which was a whole lot harder on them than future voyages are going to be.

CAPTAIN R. D. GATEWOOD (Shipping Board: I think that it would be unfair to the job and unfair to the industry and unfair to the best type of engineering to give you the results of this first voyage and let each one of you make the allowances that have to be made when the number of variables in the problem is as great as it was in the *Mercer*.

If you do not quite understand what I mean by that general statement, let me tell you some of the variables. The ship had too short a stack. We are lengthening that stack. By that I mean she had a shorter stack than any sister ship in our fleet. We did not want to spend any more money on the *Mercer* than we could and we let the stack stay just as it was when she was laid up several years ago. She did not get the draft that she should have had, that is the draft that was gotten at the Philadelphia test plant. We overlooked banking off the third boiler that we did not use—providing it with dampers whereby it could have been dampered off if we had wanted to do that. The result was again that she did not get the draft.

There was a bunker fire on board going over. It is very fortunate that it happened, in my judgment, because it did not prove to be unduly serious, but it involved the loss of a lot of coal, all of which has to be estimated. The bunkers were not accurately measured until after the demonstrations were held here in New York.

I would consider the weather on the trip very bad as regards general steaming conditions, that is miles per ton of fuel. The demonstrations held in Europe must also be estimated.

I will say, however, that the performance was materially better than it would have been with any hand fired coal ship of that type in our fleet. As a result, the cost of the fuel was much less than it would have been using oil. Certain betterments can be made, but the fundamentals of the job are absolutely sound. The performance of the vessel in the future can be so materially bettered that it would be unfair to all concerned to give out too accurate figures now and make all of the different allowances.

Let us simply say that it was materially better, in fact well above 10 percent better than a hand fired coal job and very much better from a cost point of view than an oil fired job.

I might just say the fire was at the very bottom of the bunker and it took about two days of heavy shoveling to get at it. It was just an ordinary bunker fire and had nothing to do with the pulverized coal feature installation.

QUESTION: Was there any accumulation of ash in the boilers after the ship arrived in Rotterdam, that would be sufficient to cause any lowering of the boiler efficiency?

C. J. JEFFERSON: In Rotterdam we did not clean the boilers at all. They came back with all the ash in them that had accumulated there and we did not clean them until we reached this side. First I was inclined to think that there was a slight falling off of boiler performance which I attributed to the accumulation of ash in the furnace tubes, but I went over and saw them clean the furnaces out and there was only about 3 inches of slag and coke in the bottom of the furnaces, so that did not explain it. When I got the analysis of the coal it showed that the biggest percentage of the coal that we burned on the way back was approximately 2,000 British thermal units less than that which we used outbound. I decided that that explains the difference in the fuel consumption, so while I do not consider it advisable to attempt a 3,500 mile voyage right on top of another one without cleaning the boilers, it was done in this job because we did not have time to clean the boilers out, due to demonstrations abroad. My recommendation would be to sweep the tubes at both ends of the voyage and also clean out any accumulation of slag in the furnace. We did take the slag out of the furnace on the other side, which was about 3 inches, with the exception of the 2 furnaces. We left it in them purposely to see what would happen on the way back and instead of being 6 inches thick when we got back, it was 8 inches. In a total of 7,000 miles, 8 inches was the accumulation on these 2 furnaces, but in the other furnaces on 3,500 it was about 3 inches.

QUESTION: Was it found to be a fact that your CO_2 could be maintained practically constant throughout the voyage regardless of weather conditions, providing that all machinery was running without any breakdown?

C. J. JEFFERSON: You would have to adjust the secondary air and the primary air to meet the stack draft. The stack draft changes. For instance, if you are running with a beam wind, the stack draft would be a whole lot different than if you had a following wind. If you had a head wind, the combustion conditions would be very much better than with the others, although your ship's speed would be retarded.

QUESTION: You were probably operating close to 80 percent boiler efficiency throughout the voyage?

C. J. JEFFERSON: About that high.

QUESTION: Do you think that on future installations it will be desirable to have an individual pulverizer and distributor for each boiler, or a common distributor such as the *Mercer* had originally?

C. J. JEFFERSON: On this installation all 3 boilers were on one mill. That means that you have a tremendous load on the primary fan. For the sake of economy it is better to have the individual pulverizers, one for each boiler, not only for the sake of economy, but if you have all going from one common distributor, the whole works depend upon that distributor, and that is an awful lot of responsibility.

QUESTION: Could an installation be worked out with individual units of a furnace as on the stationary furnace?

C. J. JEFFERSON: You can get the best results possible in unit control but you can also get the worst results, because you have to follow up all your air conditions on each individual unit and the thing becomes too complicated for the ordinary operating personnel to follow day in and day out.

CAPTAIN R. D. GATEWOOD: I might say just one thing in following out the evident intent of your question of whether private ownership should put money in this thing now. I think they very decidedly should. I would not say that anyone ought to equip a whole fleet now, because I think that is unwise in the present state of

(*Continued on page 112*)

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New Watertight Door Control System

Electricity used for operating the watertight doors on the Yarmouth and Evangeline

By Wm. H. Hetherington, Jr.*

ELECTRICALLY operated watertight door systems, which incorporate both remote and local control features, have been installed on the recently completed steamships *Evangeline* and *Yarmouth*, built by the Wm. Cramp & Sons, Ship & Engine Building Company, Philadelphia, Pa., for the Eastern Steamship Company, Boston, Mass. These are the first installations of this kind on passenger vessels built in the United States.

This system has been installed as an additional measure of safety, and, while departing from regular practice, is so simple in its application that the obvious advantages from the electrical system of control will appeal from the standpoint of reliability and adaptability to shipboard use.

For each of the selected watertight doors, below the waterline of the vessel, there is employed a device for opening and closing the doors which is known as a C-H Dean control unit, which consists of a driving motor, reduction gears, limit switch mechanism and a pawl device. These are all mounted in a single compact case.

Operating Mechanism

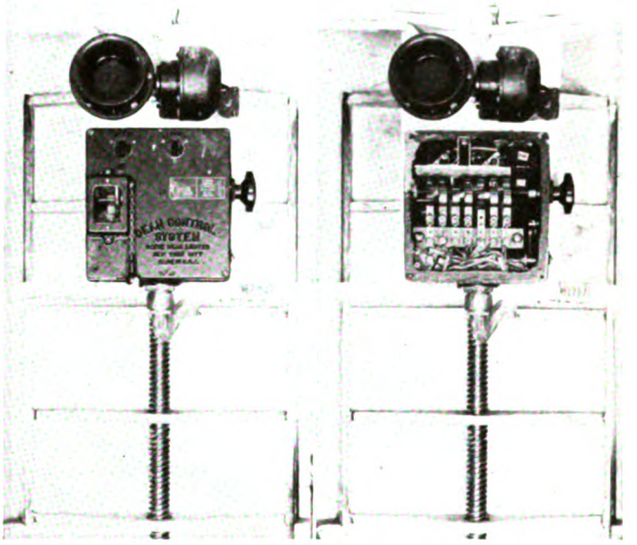
The driving motor is totally enclosed as shown in Fig. 1 and is splash-proof. It has an extremely high starting torque and is connected to a system of com-

Fig. 1.—Dean electrically driven and controlled valve — operating unit

bination worm and planetary gearing for the necessary reduction in speed on the slow speed shaft which connects with the worm shaft of the watertight door for opening and closing.

The motor shaft is coupled to the worm shaft by means of a suitable clutch, both the motor and worm shafts running in ball bearings. The worm shaft drives a worm gear which is keyed to a sleeve, the other end of which forms the sun pinion of a planetary gear system. The three planet pinions revolve on studs which are forced into a flange forming part of the slow speed driving shaft. The planet pinions mesh into an internal gear which is the outer member of the planetary gear system.

This internal gear fits into a machined recess in the casing and revolves freely in its bearings. It is provided on its outer surface with a peripheral channel containing a stop which engages a restraining pawl



Figs. 2 and 3.—Local controllers attached to watertight bulkhead on the Yarmouth

when the latter is moved into the clutch position by the action of a solenoid. The latter straightens a holding toggle when the circuit is energized and holds the pawl rigidly in place.

When the motor is started, the internal gear revolves until the stop is brought up against the pawl, suddenly arresting the movement of the internal gear and producing the starting blow which is effective in starting the door on its opening or closing travel. With the internal gear stopped, the slow speed shaft revolves and as this is geared to the rack on the door its opening or closing motion, as the case may be, begins, according to conditions of operation, until the limit of travel is reached, at which point the corresponding limit switch disconnects the motor from circuit.

Limit Switches

The limit switches are of the quick break type, ruggedly constructed with silver plated finger contacts. These switches are operated by means of a train of reduction gears driven by the slow speed shaft, the gears being contained in the casing and running in oil. Accurate limit adjustments may be obtained.

When the door is firmly sealed or is fully opened as the case may be, the proper limit switch on the C-H

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unit opens the solenoid circuit thereby permitting the restraining pawl to be quickly withdrawn by spring action. At the same time the motor is disconnected from the circuit. When the restraining pawl is withdrawn the internal gear is free to revolve with the planetary gear system, thus absorbing the momentum of the motor and bringing it to rest. The slow speed shaft and the slow moving door parts come to a stop immediately without jamming the door.

The shape of the restraining pawl is such that should the spring be broken or inoperative, the driving strain

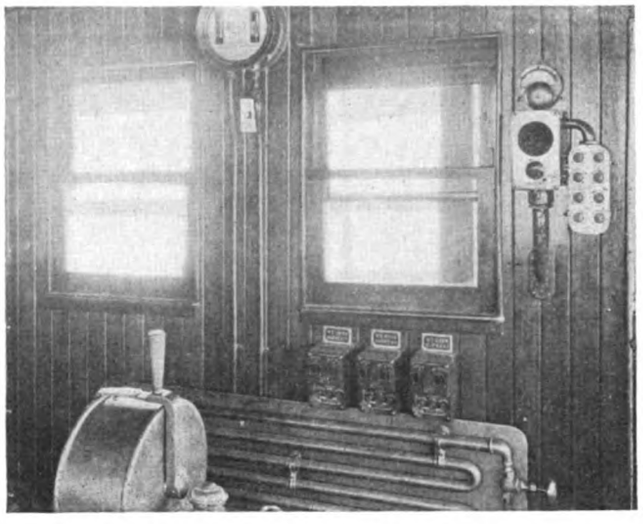

Fig. 4.—Master control station on the bridge of the Yarmouth

will force it out of engagement with the internal gear if the solenoid is de-energized.

The C-H motor operated unit is mounted on brackets attached to a watertight bulkhead and a pinion or bevel gear on the slow speed shaft is connected with the gearing on the watertight door itself so that when the unit is operated the door opens or closes directly. Control is by means of local standard bulkhead type controllers as shown in Figs. 2 and 3.

Controllers

These controls are placed near the bulkhead doors, one station being located on either side of the bulkhead which are the local control stations. There is also the master control station operated by means of push button control and which is located on the bridge of the vessel as shown in Fig. 4.

The opening action of the unit is master over the closing; that is, if the door is set to close by means of the push button station on the bridge, anyone can, from within the watertight compartment, immediately open the door by means of the local control station placed on the bulkhead adjacent to the door by turning this control station to open. The door will immediately begin opening and will continue to open until the handle of the local control station is released or until the door has become fully opened. As soon as the local control station handle is released, however, the door will again close in answer to the control of the push button station on the bridge. This enables anyone caught within the watertight compartment, when the door starts to close, to leave the compartment.

Manual Control

In addition to the C-H unit, which is the normal means of operating the watertight door with either remote or local control, there is a hand gear attached to each door for manual control. This drive is carried by means of a shaft and gears and universal joints to a hand wheel placed on the upper deck of the vessel above the waterline. The hand gear is connected with the door operating gearing by means of a solenoid operated jaw clutch.

Normally, this clutch is engaged so that the door can be opened or closed from the hand wheel in case the electrical equipment is inoperative for any reason. With the C-H Dean unit operating, however, the action of the switches which connects the Dean motor unit to the line also excites the clutch solenoid, thus disconnecting the hand gear when the door is being driven by power. In order that the operator at the hand wheel may know the position of the doors at all times, a two light indicator is placed at the hand wheel which indicates by means of pilot lights the position of the door. When the green lamp is illuminated it indicates that the door is open, and when the red lamp is illuminated it indicates that the door is closed. Similar indicating lamps are placed one set in each local control station and also one set in the push button control station on the bridge of the vessel. It is thus possible to know the position of the door at any time from any one of the control or operating points.

Advantages of the New System

It is believed that the C-H unit has many advantages for this class of application. In the first place the unit is, as previously stated, a concentrated combination of a high speed powerful motor with an efficient totally enclosed back gear drive adaptable for mounting on a watertight door drive as a complete unit and occupying very little space. These features are in contrast to the slow speed motor sometimes used for this class of service in foreign installations. An inherent advantage of the C-H Dean unit design is that the limit switches are embodied within the make-up of the unit itself so that they are really part of the equipment and not an attachment. The characteristic of the C-H unit whereby the motor is disconnected from the slow speed shaft when the current is "off" makes it unnecessary to place any kind of driving clutch between the motor and the door operating mechanism. When it is desired to operate the door by means of the hand control it is not necessary to go through any de-clutching operation.

One of the many features incorporated in the control panel is a jam relay, which, in case a piece of cargo or heavy timber happens to get in the way of the door when it is closing, inserts resistance in the motor armature circuit to prevent the electrical equipment from damage.

First Voyage of the Mercer

(*Continued from page 110*)

the game. We are not going to equip even our whole fleet on this coast right away, but we are not going to get anywhere in the standardization and practice of this thing either in installation or operation until a number of us have an installation of 2 or 3 in our various fleets.

QUESTION: You said you thought some steamship companies could go ahead and convert to pulverized coal right away. Supposing a ship we are contemplating converting had no oil installation at all. Your recommendation would go so far as to recommend that that ship be converted, we will say, to pulverized coal burning without any oil features on the ship?

CAPTAIN R. D. GATEWOOD: I would certainly say so for the coastwise service without any reservations.

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Marine Radio Progress in 1927

By T. M. Stevens*

MARINE radio has continued its steady progress during 1927. Marked strides have been made in the technique of marine radio. More ships have been provided with radio facilities. Better equipment has come to replace former equipment rendered obsolete by the development of infinitely superior methods. The radio direction finder is becoming ever more widely accepted as a necessary aid to navigation. And the way has been paved for still greater advances during 1928 and succeeding years.

Vacuum Tube Transmitters Now Used

The outstanding development in marine radio during 1927 has been the equipping of ships with vacuum tube transmitters. The conversion from spark transmitters to vacuum tube transmitters has now been going on for the past 3 years. The task has been a difficult one, because of the vast number of installations to be changed over, and the considerable investment represented in the old equipment. In some instances new equipment has been provided, while in others the old spark transmitters have been ingeniously and efficiently made over into vacuum tube transmitters, at minimum cost. The past 12 months have witnessed a bulk of this vast undertaking completed. All RCA marine equipment, whether afloat or ashore, has now been converted to vacuum tube, continuous wave transmission, while it is estimated that at least 25 percent of the entire American merchant marine is so equipped by now. Many steamship companies owning their radio equipment have begun to follow suit, so that all American shipping, with very few exceptions, will eventually be provided with vacuum tube transmitters. The recent International Radio-Telegraphy Conference recommended the conversion of all marine radio transmitters to vacuum tube practice not later than 1940, so that the Radio Corporation of America, in this respect, may be said to be 12 years ahead of time.

Over 500 American ships have by now been equipped with vacuum tube transmitters, with the remainder still operating spark and arc sets.

Range of Communication Doubled

The range of marine radio communication has been increased at least 100 percent in changing over to vacuum tube operation. Distances formerly limited to night time operation under the most favorable conditions are today spanned in broad daylight under unfavorable conditions. Even the static infested atmosphere of the Caribbean and the Gulf of Mexico present no insurmountable obstacles for the vacuum tube transmitter.

Of even greater importance than the distance spanned and the overriding of static, however, is the sharp tuning which the vacuum tube transmitter, with its continuous waves, makes possible. Interference, once so prevalent not only among marine radio transmitters themselves but also with program broadcasting, has been reduced to the vanishing point. The present vacuum tube marine transmitters have 5 available wave length bands, as against 3 for the old spark transmitters. What is more, because of the exceedingly sharp tuning of the waves, a number of channels may be established within a narrow wave length band, without undue interference, whereas the old spark transmitter was notorious for its broad tuning and consequent interference.

During 1927 the United Fruit Company, operating the largest radio establishment of any steamship company the world over, completed the changeover from its former spark transmitters to the latest type vacuum tube transmitters.

Ships in Mid-Ocean Reached by Land Stations

As an indication of the increased span and efficiency of marine radio service, due to vacuum tube transmission, it is interesting to note that most ships are now reached directly by the land stations without relaying as in the past. Furthermore, the former practice of virtually broadcasting messages from high power coastal stations to ships in mid-ocean, which could not be reached nor heard by the usual marine radio coastal station, at the special rate of 50 cents per word has passed away with the advent of powerful vacuum tube marine transmitters which reach out to mid-ocean and beyond at a flat rate of 21 cents per word.

Of particular interest, in the past year, have been the short wave experiments conducted with the S.S. *Carinthia* during the world cruise. This steamer, equipped with short wave equipment in addition to regular apparatus, kept in daily communication with RCA stations during the entire journey of some 28,000 miles. Even when the *Carinthia* was on the opposite side of the globe, it communicated with RCA stations in the United States.

With the exception of the Great Lakes no additional coastal stations have been required. Although traffic has increased steadily, the multiplexing of RCA land stations, with a plurality of transmitters, receivers and operators, forming what are virtually marine centrals, has more than taken care of marine traffic requirements.

New Stations on the Great Lakes

On the Great Lakes the demands of shipping have called for the addition of two new RCA stations at Buffalo and Duluth, aside from existing stations at Chicago and Cleveland. The present four stations are now providing positive communication with shipping in every part of the Great Lakes, doing the work which formerly required some 14 spark stations.

The close of 1927 found some 390 ships equipped with RCA direction finders or radio compasses. Navigators have come to learn the value of this device through first hand experience. Numerous radio beacons have been established along our coasts by the Bureau of Lighthouses. No small measure of safety has in this way been added to marine travel. Tens of thousands of precious hours have been saved by permitting ships to move along without danger even in dense fogs. Thrilling rescues have been effected by means of the radio direction finder in locating lost ships.

Perhaps the most thrilling role of marine radio during 1927 has been in connection with the transoceanic airplane flights. Days and weeks before various flights, marine radio was enlisted for the purpose of gathering weather bulletins from ships scattered over the ocean, and these bulletins were collated by weather bureau experts to determine the probable weather over the different proposed courses. The flights were followed by ships at sea, who flashed back reports to the States. In cases where the planes were equipped with radio transmitters, close contact was maintained through ships and marine radio coastal stations.

* Superintendent, marine department, Radio Corporation of America, New York.

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Questions and Answers for Engineers

Practical information on the operation and maintenance of boilers, engines and auxiliaries

This department is maintained to help those who desire practical information regarding engine room problems or who are preparing to take examinations for a marine engineer's license. Readers are urged to send in questions. Inquiries bearing the name and address of the writer will be answered promptly by mail. If the question is of general interest the answer will also be published in an early issue of the magazine, although the identity of the writer will not be disclosed in doing so. Anonymous communications will not be considered.

Crank Pin Clearance

Q.—What is considered a fair crank pin clearance?

A.—It is believed that this should not exceed 0.02 inch.

Regulating the Cut-Off

Q.—How can the cut-off be regulated at will and what effect will this have with the gear in astern motion?

A.—The cut-off can be regulated by adjusting the links. It will have no effect on gear while running astern.

Setting Up Cylinder Stud Nuts

Q.—What precautions are to be taken in setting up cylinder stud nuts?

A.—Opposite nuts should be tightened a partial turn each in rotation. This will insure drawing the head down evenly. The final turn in each case may be made by means of sharp sledge blows on the wrench handle.

Hot Bearing

Q.—When a bearing runs hot in service should the engine be at once shut down?

A.—If the engine is shut down, the babbitt will probably grip the pin. The load should be thrown off, the lubrication increased and the engine run at slow speed until the bearing has cooled.

Valve Setting

Q.—Describe the setting of the valves in a reciprocating triple expansion engine.

A.—Put the engine on the top dead center, run cut-off all the way out then measure lead on top of the steam port; then put the engine on the bottom dead center and measure the lead on bottom; then equalize lead giving a little more on the bottom.

Average Net Piston Pressure

Q.—Explain how the average net pressure on the piston can be changed.

A.—The average net pressure on a piston can be changed by varying the pressure of the steam admitted to the cylinder; by changing the point of cut-off which will vary the ratio of expansion or by varying the back pressure.

Reduction Gear Operation

Q.—What are the principal things to look after in running of reduction gears?

A.—Lubrication of gear bearings and teeth, alinement and fore and aft clearance are most important items to be watched in operating reduction gears.

Horizontal Duplex Steam Pump

Q.—Why is the horizontal duplex steam pump in general use in tank steamers in spite of its large fuel consumption?

A.—This type of pump has been found to be very reliable. Its large steam consumption is not such a serious objection as might, at first thought, be supposed, because it is in use but a small portion of the time.

Detecting Short Circuits

Q.—How are shorts and grounds detected on the switchboard of a direct current lighting plant?

A.—If you have ground lights on switchboard one or both will brighten up if you have a ground or short circuit. If you have a circuit breaker it will jump out. If you have neither one you will blow a fuse. Even with both, a fuse along any line or circuit will blow before it shows up on the switchboard, as a general rule.

Throw of an Eccentric

Q.—Explain what is meant by the throw of an eccentric. What is angular advance and explain the meaning of eccentric position.

A.—The throw of an eccentric is the distance between the center of the eccentric sheave and center of the crank shaft. Sometimes this is called the radius of eccentricity. Angular advance is the distance that the high point of the eccentric is set ahead of a line at right angles with the crank, or generally speaking the lap angle plus the lead angle. Eccentric position expressed in degrees is the highest point of the eccentric relative to the center of the crank pin.

Capacity of Cylindrical Tank

Q.—How many gallons of water will a cylindrical tank hold that is 6 feet 6 inches long by 2 feet 10 inches in diameter? One gallon contains 231 cubic inches?

A.—The volume of a cylindrical tank with flat ends equals the area of the cross section of the tank in square inches multiplied by the length of the tank in inches.

$$\text{Volume} = \frac{\pi D^2}{4} \times L$$

Where D = diameter of tank in inches.
L = length of tank in inches.

Volume = $0.7854 \times (34)^2 \times 78 = 70{,}817.95$ cubic inches.

Divide the volume of the tank in cubic inches (70,817.95) by the number of cubic inches in a gallon (231) and the result will be the number of gallons the tank will hold, or 306.57 gallons.

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Raising Steam

Q.—With a cold boiler how long would you take in getting up steam in a Scotch boiler and a pipe boiler?

A.—About 12 hours in a Scotch boiler with at least two hours circulating water and about two hours in a pipe boiler.

Refractories

Q.—What is the meaning of the term "refractory" when used in connection with boiler construction?

A.—This term generally refers to materials capable of withstanding very high temperatures and so suitable for use as boiler furnace linings. Fire clay brick, silica brick, magnesia brick are examples of these materials.

Fire Pump Capacity

Q.—In case of a passenger steamer 1,000 gross tons or over, how many cubic inches of fire pump capacity would be required according to rules of the U. S. Steamboat Inspection service?

A.—Steamers under 5,000 gross tons shall have not less than 1/3 cubic inch pump cylinder capacity for every gross ton.

Function of Slide Valve

Q.—What are the functions of the slide valve and on what does the development of the full power of the engine and its economical and efficient use of steam largely depend?

A.—It controls the admission and expansion of the steam and the closing of the exhaust. With the correct adjustment of the valves the best results of an engine are obtained. The same general principles apply to other types of valves.

Seized Piston Pin

Q.—Is there such a thing as a seized piston pin?

A.—Mr. L. H. Morrison in his book "Oil Engines" discusses this subject briefly. When at the close of a run the cooling water is shut off too soon, the heat in the piston head may evaporate all the lubricant on the piston pin. When turning the engine over at the beginning of the next run, the dry bearing absorbs the heat. It cannot expand outward because of the relatively large mass of the connecting rod end. Then the bearing closes in on the pin which is also expanding; this action results in gripping or seizure. This is sometimes mistaken for a seized piston instead of a seized piston pin.

Seized Pistons

Q.—In an oil engine what is the cause of seized pistons?

A.—This difficulty is usually chargeable either to insufficient clearance between piston and liner or to lack of cooling water.

In the first case, the high temperatures cause diametric expansion. If there is insufficient clearance between the piston head and the cylinder wall, seizing will occur.

To avoid this a slight taper may be given to the piston, the clearance decreasing downward toward the piston pin.

In the second case, it is usually the result of too sudden increase in the supply of cooling water. This results in chilling the cylinder liner, causing it to contract before the hot piston receives any effect from the additional cooling water. The contraction of the liner decreases the clearance; the temperature of the piston rises and finally seizing takes place.

Amount of Lubricating Oil for Engines

Q.—How much lubricating oil would you think necessary for a 2,000 to 2,500 horsepower engine?

A.—About 6 gallons in 24 hours for a reciprocating engine and whatever the leaks amount to in a steam turbine.

Precautions Necessary When Using Fuel Oil

Q.—What are the chief points which require attention when using fuel oil?

A.—Tight connections on all oil lines, clean burners and fuel oil strainers. Correct temperatures and pressures for complete combustion and care that refuse oil is not allowed to collect in the bilges or other parts of the fire room where it is apt to start a fire. See that sand boxes are full and fire extinguishers are handy.

Types of Safety Valves

Q.—How many types of safety valves are in use and which is the best adapted to all kinds of service?

A.—The level safety valve and the spring pop type. The spring loaded pop safety valve is best adapted for the reason that any inclination of the boiler caused by the ship pitching or rolling in a heavy sea does not interfere with the working of a spring-loaded pop valve; while the leverage of a weighted lever valve decreases with any inclination of the boiler that would momentarily put the lever in an inclined position.

Expansion of Steam Pipes

Q.—A pipe 200 feet long at 70 degrees has the steam turned on at 100 pounds; what would be the linear expansion? What precaution would you take in the installation of such a pipe?

A.—Pipes used for steam fitting expand about 1½ inches per hundred feet in length for usual changes in temperature. Precaution must be taken by using expansion joints and bends or offsets. If loops or bends are used they should be made horizontally so as to prevent forming a pocket. Care must be taken that pipe is not bound tight with hangers or through bulkheads. Pipe should be tested with pressure to detect leaks before being covered with asbestos.

Diesel vs. Steam Engines

Q.—How does a four cycle Diesel engine compare with a reciprocating steam engine in weight and volume for the same horsepower and why?

A.—It is not possible to make a comparison of weight and volume between a Diesel and steam reciprocating engine of the same horsepower unless there be given specific data upon which to base such an estimate, such as the revolutions per minute of both engines, steam pressure, superheat, if any, number of cylinders in which the expansion takes place and the service for which the engines are intended.

Formula for Horsepower of Turbine

Q.—Will you kindly furnish me with the formula for calculating the horsepower of marine turbine engines? W. R. B.

A.—Mr. J. W. M. Sothern in his book "The Marine Steam Turbine" states:

The turbine horsepower may be found by calculation if the steam consumption, heat drop per pound steam, and turbine over all efficiency are known, thus—

$$\text{Turbine horsepower} = \frac{\text{Heat drop} \times \text{pounds steam per minute} \times 778 \times \text{efficiency}}{33{,}000}$$

In the above formula the number 778 expresses the foot pounds in one British thermal unit (B. T. U.)

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Questions and Answers Relating to Ship Design and Construction

By J. L. Bates, Naval Architect, and W. B. Newton, Marine Engineer

This department is maintained for the purpose of answering all questions relating to ships and their machinery. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Surface Area of Irregular Tanks

Q.—I desire very much to know any means or formulae by which I can derive the surface area of the inner sides of ships' tanks in terms of tons salt water capacity. Answers to any of the following questions will help me:

Is there any method other than segregation for calculating the surface area of an irregular tank when the capacity is given?

What is the average inner surface area of a 100-ton peak tank? For a 50-ton peak tank? E. N. W. H.

A.—There is no fixed geometrical relationship between the inner surface and the volume of ships' tanks. Therefore, it is not practicable to obtain a formula which will permit the finding of the surface with accuracy when the capacity only is known.

It might be possible to obtain approximations by the following methods, provided similar types and sizes of ships are considered with tanks similarly located and shaped:

In a rectangular tank similar to an inner bottom tank let

Length = L
Width = W
Depth = D

Assume that the capacity is to be stated in tons of salt water at 35 cubic feet per ton.

Assume that no allowance is to be made for the surfaces of framing, brackets, etc., then

$$\text{The capacity in tons} = \frac{L \times W \times D}{35}$$

$$\text{The surface} = 2\ (L \times W + L \times D + W \times D)$$

CASE No. 1

Now assume L=10, W=8, D=4, all in feet

$$\text{The capacity in tons} = \frac{10 \times 8 \times 4}{35} = 9.14$$

$$\text{The surface} = 2\ (10 \times 8 + 10 \times 4 + 8 \times 4) = 304$$

The surface for this tank in square feet is 33.3 times its capacity in tons.

CASE 2

Now assume L=10, W=8, D=2, all in feet
The capacity in tons=4.57
The surface=232
The surface for this tank is 50.8 times its capacity in tons.

The two cases above illustrated the fact that the relationship between surface and volume is subject to considerable variation even for rectangular tanks.

The variation to be found between these two characteristics in peak tanks is fully as great as shown by the following examples:

Type of ship	Capacity in tons salt water For'd Peak Tank	Capacity in tons salt water After Peak Tank	Approx. Surface, sq. ft.	Sq. ft. per ton capacity
	78.6	....	1334	17.0
Repair ship	....	70.5	784	11.1
	....	33.4	1435	43.0
	15.0	....	382	25.5
Gunboat	....	6.1	338	55.4
	1934	....	2394	12.4
Oil tanker	....	87.8	1656	18.9

The figures given above take no account of the effect of structure such as floor plates, frame bars, deck beams, etc., upon the area of surface. Nor do they allow for any fairing and filling with cement and coke. The structure, if allowed for, would increase the area considerably and the cement and coke would probably decrease it somewhat.

The figures for capacity in tons have been taken from tabulated data and are net. That is, allowance has been made for structure in arriving at the capacities given.

Effect of Tide or Current on Waves

Q.—It is evident that when the tide or current runs to windward the character of the wave changes. If the wind is blowing 20 miles an hour and the current running towards it at 5 miles an hour, the effect is altogether different than it would be if the water were stationary and the wind blowing over it at 25 miles an hour. To me it seems the effect should be the same, as in either case the two elements are in identical relation to each other as regards wind force over the water. C. F. F.

A.—The writer is unable to make a definite reply to the question which you ask. It is very difficult to observe and to study wave profiles under varying conditions with any degree of accuracy.

In order to examine the influence which waves may have upon a ship, some theory as to their dynamic constitution is required. Such a theory is not to be understood as an accurate representation of the truth itself but rather as a method of properly relating the known facts and deducing mathematically the probable nature and extent of the influences which are to be examined and the facts anticipated. The simplest and the most generally used theory is that known as the "trochoidal." This theory assumes (a) that in any given wave all particles revolve in fixed circular orbits in vertical planes parallel to the direction of propagation; (b) for any layer of water originally horizontal the radii are equal and the centers are on the same horizontal line; (c) that the radii decrease with increase of depth, according to a certain law; and (d) that all particles originally in the same vertical are always in the same phase.

Another system is known as the "irrotational." This system presupposes a drift or a current in the direction in which the waves are running. In this type of wave the water affected by the wave motion is supposed to have had originally a uniform velocity upon which has been superposed an oscillation giving rise to a series of waves with crests that have a velocity equal and contrary to the original uniform velocity.

Waves of the trochoidal type have much less pronounced crests than those of the irrotational type. It appears that in the case of waves in water without current, the trochoidal theory might best represent the actual facts; while it is believed that where a current exists, the irrotational system may be more nearly accurate. If this is the case there may be a real difference in the wave generated under the two assumptions which you make.

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There are a number of discussions covering the subjects of the formation and propagation of waves. It is suggested that you will find a considerable amount of valuable information on this general subject by reference to such works as those listed below. However, you will probably not find a definite answer to your particular question.

"Naval Architecture" by Cecil H. Peabody, published by John Wiley & Sons, Inc., New York.

"Design and Construction of Ships" by Professor John Harvard Biles, published by Charles Griffin & Company, Ltd., Exeter Street, Strand, London.

"The Speed and Power of Ships" by Rear Admiral D. W. Taylor, U. S. N., published by John Wiley & Sons, Inc., New York.

After Cofferdam in Tanker Is a Ballast Compartment

Q.—When a cofferdam is fitted between the after fuel tank and the boiler room in an oil tanker with machinery located aft, should this cofferdam be included in tonnage measurement?

A.—Such cofferdams are required by classification societies and the United States Steamboat Inspection Service where low flash point oil is to be used. Many times such tanks are included when high flash point oil is to be burned. When fitted, they are fitted as a precautionary measure. Naturally they are not piped for oil carriage. Such cofferdams are solely ballast compartments. They should, therefore, be excepted.

Use of Bilge Blocks in Dry Docking Tugs

Q.—During the consideration of a marine railroad, end haul, 800 tons, the advisability of carrying the entire weight of a tug on the keel, eliminating the bilge blocks has been discussed. The tugs are wooden construction of various designs with a maximum displacement of about 250 tons. Will you kindly give your opinion of the feasibility of carrying the entire weight of the tug on a continuous keel block? H. A. B.

A.—It is believed that marine railways are rarely, if ever, built without being fitted with bilge blocks. The primary objects of bilge blocks, particularly in small docks, are both to prevent undue strains on the hull of the vessel docked, and to prevent the heeling of the vessel as she is gradually lifted clear of the water. Most of the small tugs with which the writer is familiar have relatively high floors and moderate values of midship section coefficient. Such vessels frequently are unstable at waterlines in the vicinity of or below the bilge. Their transverse strength is usually ample to withstand all sagging tendencies in the bilges.

In the cases of scows or other full bodied, flat floored vessels, there is less tendency toward instability but bilge blocks are important in supporting the weight of the hull structure and preventing the sagging of the bilges or bottom. Also it is thought that even very flat floored vessels could not be insured against tipping after leaving the water without the use of bilge blocks or their equivalent.

Automobiles Shipped Uncrated

WHEN the S. S. *Eberstein* sailed from New York recently, bound for Europe under charter by The Studebaker Corporation of America, she carried as cargo 500 Studebaker and Erskine automobiles all of which were shipped unboxed. Shipping cars in this manner has been an accepted practice for some time on passenger steamers carrying cars for tourists, but heretofore it has not been possible to make large shipments of passenger cars to foreign dealers without boxing.

Lloyd's Rules for Steel Yachts

A NEW set of "Rules for the Building and Classification of Composite and Steel Yachts of the Cruising Type" has been published by Lloyd's Register of Shipping, New York. These rules have been in the course of preparation for several years and take precedence over all formerly published yacht rules for this class of boat.

A similar revision was made a short time ago in connection with the rules for the building and classification of wood yachts and these have been found of great assistance to yachtsmen, yacht builders, designers and repair yards. The new publication also includes the society's rules for internal combustion engines, Diesel engines, steam engines and electric fittings.

Abstracts of Articles Translated from the Foreign Press

Freighters Baarn and Booskop

Built for the Kon. Nederlandsche Stoomboot Mij. Dimensions 400 feet length, 58 feet beam and 37.5 feet depth to shelter deck. There are two complete decks and a third deck in the forward and after holds. There are three cargo hatches to the forward hold and two to the after hold. Two masts are installed each fitted with eight 5-ton cargo booms and one 40-ton boom for the handling of the cargo. There is a large deck house with accommodations for 29 passengers and all officers. Spacious saloons are included in the accomodation. The crew's quarters are aft. The propelling machinery for the *Baarn* consists of a 2,800 indicated horsepower Lentz valve engine; that for the *Booskop* consists of the ordinary triple expansion engine, also of 2,800 indicated horsepower. Each vessel has three single ended boilers 15 feet long and 12.5 feet diameter.—*Het Schip*, July, 1927, 3 pages, arrangement plans, structural plans, 2 photographs.

Steamships Arucas and Orotava

A new passenger and freight line to the islands in the South Atlantic was inaugurated recently by the North German Lloyd line with the new steamers *Arucas* and *Orotava* built by Germania Werft, Kiel. The line goes from Bremen via Antwerp and Lissabon to Madeira and Teneriffe. The vessels are built specially for the fruit trade. The number of passengers carried is only 48. A good deal of attention has been given to the passenger quarters in the way of large staterooms, tastefully decorated saloons and large open deck spaces.

The vessels are now on their maiden trips. During the winter months, when the banana fruit trade is stopped, the ships will be put on the Brazil service.

Their principal dimensions are: Length, 336 feet; breadth, 46.5 feet; depth, 25 feet to main deck. Their cargo capacity is 3,300 tons on summer freeboard. The vessels have two complete decks and six watertight bulkheads. Their cargo is handled through 4 main hatches by 8 winches and 9 booms, the latter, being in a very high position, allow a deck cargo 18 feet high to be carried.

The passenger quarters are on *A*, *B* and *C* decks; captain's, officers' and engineers' quarters on the boat deck and the rest of the crew are forward on *D* deck.

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The propelling machinery consists of a 2,200 indicated horsepower triple expansion steam engine giving the vessel a speed of 13 knots when fully loaded. Three boilers with Howden's forced draft deliver steam to the main machinery.—*Schiffbau,* September 21, 1927. 2 pages, 4 photographs.

New Books

THE RUNNING AND MAINTENANCE OF THE MARINE DIESEL ENGINE. By John Lamb. Size, 7½ by 5 inches. Pages, 523. Illustrations, 225. London, 1927: Charles Griffin and Company, Ltd., Philadelphia.

This is the third edition of a reference book on the operation and maintenance of marine Diesel engines. Since the second edition was published, the author has gained further experience ashore and at sea on vessels propelled by different types and makes of Diesel oil engines. His experience in this connection is incorporated in the new edition, which has involved rewriting all the existing chapters and adding new ones. In this book it has been necessary to extend considerably the chapters on Liquid Fuels, Combustion of Fuel, Lubrication, Starting Mechanism, Reversing gears, Indicators and Indicator Diagrams, the Hot-Bulb Engine, and Air Compressors, while new chapters deal with the Mechanical Injection Engine, the Opposed Piston Engine and the Still Engine, Port Work and Watchkeeping.

The book has been reset in a convenient form and to facilitate reference to the illustrations, an alphabetical list precedes the subject index. The book is practical in every way and has been arranged throughout in order that sea going engineers, especially those changing over from steam, may derive the greatest assistance in their work. Troubles which may possibly occur in the running of Diesel and other oil engines are indicated and practical ways of preventing and remedying these are clearly shown.

DIESEL ENGINES FOR LAND AND MARINE WORK. By A. P. Chalkley. Size, 8¼ by 5¼ inches. Pages, 320. Illustrations, 196. New York, 1927: D. Van Nostrand Company, Inc.

This is the sixth edition of this work which has been revised and greatly enlarged. The revision involves not only the addition of descriptions and illustrations of many new engines—particularly those operating on the double-acting principle—but also the introduction of new sections dealing with the modern development in general design, applicable to all types. The author has prepared in this sixth edition a comprehensive outline of the present position of the Diesel engine in all its applications; the marine aspect has been emphasized because modern conditions have rendered this phase of special importance. The evolution, however, is reflected on a smaller scale in stationary design.

The book is one of the most complete reference works on the general theory, design and construction of all types of Diesel engines with which engineers are called upon to deal. It includes details of the design and construction of four-cycle, single acting engines, high speed engines, horizontal engines, two-cycle engines, with an explanation of various factors entering into their construction, and double-acting engines. Airless injection engines and problems of testing Diesel engines are discussed under the general subject. Finally in chapters devoted to engines for marine work, the development of the various types is again considered. The book is in effect a complete manual for the student as well as for the operator or builder of Diesel engines.

Communications

Pulverized Coal

BOSTON, MASS

TO THE EDITOR:

The installation of pulverized coal on the S. S. *Mercer* is a matter of great importance to shipping. To me it is of special interest, because, during the war, I was employed by the Fleet Corporation, finally as head of the boiler testing unit. After testing a number of watertube boilers it was decided to test a 15-foot 3-inch Scotch boiler with three furnaces. After arranging for hand firing tests, I proposed, and was allowed to begin arrangements for, a series of tests with pulverized coal.

After the hand fired tests were nearly completed I resigned and Mr. Jefferson finished the arrangements and proceeded with the tests in December, 1920. I had had some previous experience with pulverized coal and felt that it would be a real triumph of great importance if coal in the pulverized state could be efficiently burned in Scotch boilers. I hope the installation on the *Mercer* will prove that it is a complete commercial success.

Since I left the Fleet I have had an extended experience in the use of this fuel on land and have realized the necessity of developing a burner which would bring about an intimate mixture of fuel and air close to the burner. When this is done the necessary mixing is not dependent upon a long travel of the fuel, and the fuel will burn instantly if the temperature is sufficient. My experience, therefore, has caused me to conclude that the burner for pulverized coal is the soul of the equipment. This is especially true in a boiler having as little furnace volume and travel length as the Scotch type. While fineness of pulverization is desirable and should always be insisted upon, I have been surprised to see how well coal so poorly pulverized that less than 50 percent would pass through a 200 mesh will burn if it is properly mixed with air.

There are many pulverizers that will produce coal fine enough to burn in a Scotch boiler, if the burner is right, and it should be assumed that such a pulverizer is used. This, however, would accomplish little if the burner is not a good mixer.

In view of these considerations I have read Mr. Jefferson's paper and the discussions with the greatest interest and observe that he ascribes the success of the installation to the excellence of the whole combination. No matter, however, how good the combination may be, I believe that the success was due to the Peabody burner, because this had the property of doing everything that is necessaryto the fuel that was delivered to it; without this property, no matter how fine the pulverization or how equal the distribution to the three furnaces may have been, success would have been absent.

I write this because I believe that credit should be given where it is due in a situation, which, probably, is the most difficult that will be encountered in the application of finely divided coal to a boiler.

F. W. DEAN,
Consulting Engineer.

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Personal

A. Gardner, who has been a marine engineer for 30 years, was recently transferred as chief engineer of the S. S. *Point Bonita,* operated by **Swayne & Hoyt, Inc.,** San Francisco, Calif. Mr. Gardner has been with this company for 7 years and is well known on the Pacific coast.

Captain Paul Grening has been appointed director for Europe of the **United States Merchant Fleet Corporation.** He formerly was master of the lines *President Harding,* and has been acting director for Europe since May, when he succeeded **Joseph E. Sheedy.**

Ernest H. Peabody, president of the **Peabody Engineering Corporation,** New York, has resigned from the fuel conservation committee of the **United States Shipping Board** of which he had been a member since its inception, representing the **Society of Naval Architects and Marine Engineers.**

Martin L. Katzenstein, for the past 25 years manager of the marine department of the **Worthington Pump and Machinery Corporation** of New York, has been appointed vice president of **L. Katzenstein and Company,** engineers and contractors, and will direct the downtown office which was recently opened at 117 Liberty Street, New York. Mr. Katzenstein will give expert advice on the selection, purchase, sale and repair of machinery and equipment for ships as well as handle the sale of torsiographs, vibrographs, tachometers, metallic packings and Diesel engine indicators. The factory of this company is located at 358 West street, New York City, and includes a machine shop fully equipped for repairing and overhauling ships' machinery of both the steam or Diesel type.

Martin L. Katzenstein

Joseph E. Dorward, formerly of S. S. *Leviathan* of the United States Lines, New York, is now superintending engineer of the **American Export Steamship Corporation** of Brooklyn, New York, succeeding **H. Y. Cunningham** who has resigned on account of ill health.

Winfield M. Thompson, who for several years has been publicity manager of the **International Mercantile Marine Company** of New York, has been appointed field agent of the **Panama Pacific Line.** He will assume his new duties on February 15 and will be associated with the company's San Francisco and Los Angeles office. Mr. Thompson has had many years' experience in the newspaper field prior to the war. During the war he was field agent of the **Shipping Board** recruiting service and was engaged in organizing schools for training engineers and deck officers to serve in the war built merchant fleet.

W. Selkirk Owen, who for the past five years has been assistant naval architect of the **Maintenance and Repair Division of the United States Shipping Board,** has been appointed professor of naval architecture and dean of the faculty of **Webb Institute of Naval Architecture,** New York, to succeed the late professor **A. C. Besselievre.** In 1919 Mr. Owen was naval architect of the **Pusey and Jones Company,** Gloucester, N. J. Since 1908, he has had extensive experience in ship design, drafting and estimating work, having been employed nearly eight years at **William Cramp and Sons Ship and Engine Building Company,** Philadelphia, Pa., at the **Philadelphia Navy Yard** and at the **New York Shipbuilding Corporation,** Camden, N. J. In 1914 he was in charge of the hull scientific branch of the **Seattle Construction and Drydock Company,** Seattle, Wash. Born in Athens, Georgia, in 1884, Mr. Owen attended the public schools in Baltimore and graduated with high honors in 1903 from the Webb Institute, then known as Webb's Academy. He served over a year at sea in the engine room of vessels of the Ward, Red D and Mallory Lines and holds an assistant engineer's license. Mr. Owen was 4 years in Scotland where he continued his studies and was graduated in 1907 from the University of Glasgow with the degree of Bachelor of Science. Thereafter for one year he was assistant instructor in naval architecture at the University under Professor Sir John Harvard Biles and was also employed by Professor Biles in the latter's marine consulting offices in Glasgow and London. In 1917 he was United States Navy resident inspector of submarine chaser construction at Nyack, N. Y. Mr. Owen entered upon his new duties February 1, 1928. He is a member of the Society of Naval Architects and Marine Engineers and also of the Propeller Club of the Port of New York.

W. S. Owen

Theodore Brent, former traffic manager of the **Mississippi Warrior Barge Line,** has been appointed vice president of the **Redwood Steamship Line,** Gulfport, Miss. **E. L. Throgmorton,** former acting manager of the Redwood Line, has been appointed vice president and general manager. The Redwood Line operates between New Orleans, Mobile and Gulf ports and California.

E. J. Manion, assistant general manager of the **Blue Funnel Line** at Seattle, Wash., was recently elected general chairman of the **Pacific Westbound Conference** at the quarterly meeting of the body at Santa Barbara, succeeding **M. J. Buckley,** freight traffic manager of the **Dollar Steamship Company,** San Francisco. **W. G. Tait** of Seattle was named general secretary for the next period. **E. J. A. Watts** remains secretary of the southern division of the conference at San Francisco.

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C. A. Harper has been appointed assistant port engineer for the **Lykes Bros.-Ripley Steamship Company** at Galveston, Texas.

A. F. Macauley, port engineer for the **Ore Steamship Corporation** (New York), with headquarters at Sparrows Point, Md., has retired from service. Mr. Macauley intends to spend part of his time in making a tour of his homeland in Scotland.

Commodore Herbert Hartley, former commander of the S. S. *Leviathan,* has become associated with **the Transoceanic Corporation of the United States** with headquarters in New York. This company proposes to run four-day airplane carrying liners between this country and Europe. In the future this will be the only business connection which Commodore Hartley will have. As an official of the corporation he will have personal charge of recruiting and training the operating personnel of the Transoceanic Corporation and will give personal attention to the construction and trials of the ships that the corporation proposes to build and operate. Commodore Hartley was born at Oswego Falls, N. Y. in 1875 and began his seafaring career as a cadet on the frigate *Saratoga* then used as a training ship. In 1895 he entered the service of the American Line as a cadet and continued with that line until his appointment as commander of the *Leviathan* most of his career being spent on board the S. S. *St. Louis.*

Commodore Herbert Hartley

Captain W. J. Rague, one of the best known American skippers, who is now representing the **United States Shipping Board** at Copenhagen, was elected president of the **Neptune Association** at the recent annual election of officers, held at New York, succeeding **Captain Harold A. Cunningham,** master of the steamship *Leviathan,* who declined to accept the presidency for a second term. Other officers elected were: **Captain H. A. Anderson,** first vice president; **Captain Herbert Hartley,** former master of the *Leviathan,* second vice president and Captain **John F. Milliken,** secretary and treasurer.

P. J. Dromgool, marine superintendent of the **Pan American Petroleum & Transport Company** at New Orleans, La., has been appointed marine superintendent of the company in the New York district relieving **P. H. Harwood,** vice president, who is giving up active charge of that department to devote his attention to other matters. Mr. Dromgool has been marine superintendent of the New Orleans district for 10 years having come to the company from the **United States Steamboat Inspection Service** in which he had been employed for a number of years. Mr. Dromgool will assume charge of the New York district on March 1. **W. C. Cook,** his assistant for several years, will continue in active charge of the New Orleans office as marine superintendent.

Obituary

Frank B. Davis, chief engineer with the **Luckenbach Steamship Company** of New York for many years, died recently in Panama.

C. M. Paxton, well known marine engineer and inventor and advocate of the stream line system of ship propulsion, died recently at his home in Piermont-on-Hudson, N. Y., after a short illness.

Joseph T. Halpin of Iowa, assistant manager of the sales division of the **United States Shipping Board,** died recently at his home in Washington. Mr. Halpin had been employed by the board for seven years.

Captain George W. Harney, supervising inspector of steam vessels for the Baltimore district, with headquarters at Norfolk, Va., died suddenly in Greensboro, N. C., recently. Captain Harney was one of the best known government officials on the Atlantic coast.

William J. Davidson, president of the **Staten Island Shipbuilding Company,** Port Richmond, New York, died recently in Los Angeles, Cal., while on his way to Honolulu. Mr. Davidson was born in England in 1852 and at the age of 9 years came to this country with his parents. When he was 15 he became apprenticed to the **Canada Marine Engine Building Works** at Montreal and a few years later became chief engineer of the company's largest passenger vessel. In 1882, he became superintending engineer of the **Starin Line,** Staten Island, N. Y. Twelve years later with **James Clute** and **William Carnie,** Mr. Davidson formed a partnership for handling ship repairs and construction. In 1898, the firm merged with the **Burlee Dry Dock Company,** with Mr. Davidson as secretary and treasurer of the new concern. In 1907, with Mr. Burlee's retirement, Mr. Davidson was elected president of the firm, the name then being changed to the Staten Island Shipbuilding Company.

W. J. Davidson

Samuel Sutton, until recently vice president and general manager of the **Monticello Steamship Company,** San Francisco, Cal., died at his home in San Francisco, at the age of 68 years. For the past 40 years Mr. Sutton held many prominent positions in the marine engineering field on the west coast, since 1905 being identified with the Monticello Steamship Company until it was taken over by the Golden Gate Ferry interests a few months ago, at which time he retired from active business.

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Ship Construction and Repair News

Proposed work—Bids asked—Bids received—Contracts awarded—Current activities

Final Changes Made in Plans for Two Panama S.S. Company Ships

AFTER considerable delay in making final changes in the plans and specifications for the construction of two 500-foot passenger ships for the Panama Steamship Company, New York, it has been learned officially that work has been practically completed so that it will be possible to issue the specifications shortly.

It is understood that the new ships will be fitted with geared turbines, driving twin screws. Auxiliaries will be electrically driven and current will be supplied by Diesel engines, connected to generators. Steam will be supplied by water-tube boilers at 300 pounds per square inch pressure and 150 degrees superheat.

Dravo Company To Open New Yard at Wilmington, Del.—First Order is for 10 Barges

THE Dravo Contracting Company of Pittsburgh, Pa., will open a shipbuilding and assembling plant in Wilmington, Del., with a frontage of 878 feet on Christian River. The new plant will cover approximately six and one-half acres and will be devoted to the building of steel barges and floating equipment. The construction of 10 steel barges for the Arundel Corporation of Baltimore, Md., will take place at the new plant.

Lawley Yard Awarded Contracts For Two Yachts

INFORMATION has been received that contracts were placed recently with the George Lawley and Son Corporation, Neponset, Mass., for the construction of two private yachts, the owners of which cannot at this time be ascertained. The first yacht, which will be driven by Diesel engines, will have a length of 250 feet, while the second, an 85-footer, will be propelled by gasoline engines.

Wooden Deck Barges Ordered

THE United States Engineer Office, Montgomery, Ala., has awarded a contract to the Murnan Shipbuilding Corporation, Mobile, Ala., for the construction of two creosoted wooden decked barges, at a price of $11,800 for both. Bids for the work were received at Montgomery recently. The boats are to have a length overall 80 feet; breadth, outside of planking 25 feet; breadth, overall, 25 feet 7¼ inches; depth at side over planking 4 feet 8 inches; depth at center line over planking 5 feet, and camber in 25 feet, 4 inches.

Plans Being Prepared for Oil Tanker to be Equipped with Mercury Type Boilers

PLANS and specifications are being prepared by the Sun Shipbuilding and Drydock Company, Chester, Pa., for the construction of an oil tanker of about 20,000 tons displacement and about 15,000 tons deadweight carrying capacity, to the order of the Sun Oil Company, Philadelphia, Pa.

A special feature of this vessel will be the installation of mercury type boilers, developed by W. L. R. Emmet, consulting engineer of the General Electric Company, Schenectady, New York. Boilers of this type have been working successfully for a number of years at a shore station located in Hartford, Conn. It will be the first installation of steam generating equipment of the kind aboard ship.

The tanker will be driven by a single screw at a speed of about 11 knots. The main propelling machinery will probably consist of geared turbines although turbo electric drive is being considered. Further details will be available shortly.

Design of Berwind-White Colliers Being Modified

THE latest information regarding the award of a contract for the construction of two colliers for the Berwind-White Coal Mine Company, 1 Broadway, New York, bids for which were received at the company offices on December 22, is that the bids were too high and, after certain modifications in the plans and specifications have been made, new figures will be obtained. It is expected that it will take about a month before any decision can be made regarding the matter. Plans and specifications for these vessels were prepared by Theodore E. Ferris, naval architect, 30 Church street, New York.

Authority Asked From Shipping Board to Convert Six Freighters to the Use of Pulverized Coal Fuel

DUE to the successful experiment of burning pulverized coal on the United States Shipping Board freighter *Mercer*, which recently completed its round trip between New York and Rotterdam, Captain R. D. Gatewood, manager of the maintenance and repair division of the Shipping Board, has requested authorization from the Shipping Board commissioners to convert six additional freighters for the use of pulverized coal fuel. The saving effected during this voyage was estimated at $4,000. At this rate, it is stated, the cost of installation can be absorbed in 12 to 15 voyages.

Shipping Board Will Soon Issue Specifications for Emergency Compressors

SPECIFICATIONS are rapidly nearing completion at the offices of the maintenance and repair division of the United States Shipping Board, 45 Broadway, New York, for emergency compressor equipment to be used in the forthcoming program for converting eight vessels from steam to Diesel engine drive. It has not as yet been learned whether 1 or 2 compressors will be required on each vessel, nor have any of the details been given out. However, these specifications will undoubtedly be issued in the near future to prospective bidders, at which time further information will be available for publication.

Appropriation Asked to Build Three Coast Guard Cutters

AT a hearing of the committee on appropriations of the House of Representatives, Tuesday, January 24, consideration was given to the appropriation of funds for the construction of 3 revenue cutters for the United States Coast Guard service. The request met the approval of the committee so that the matter will undoubtedly come before the House within a short time for discussion.

It is not expected that any opposition will be raised to the appropriation of funds for building these cutters, which will be duplicates of the 5 now under construction at the Fore River (Quincy, Mass.) plant of the Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa. A contract for these 5 cutters was awarded to the Bethlehem Corporation, July, 1927, at a price of about $3,172,550.

The vessels have a length overall of 250 feet, beam, molded, 42 feet, displacement at 15 feet mean draft, about 2,075 tons. Turbo-electric drive will be installed and propelling machinery for each vessel will develop approximately 3,000 shaft horsepower.

Penn. R. R. May Ask New Bids for Floating Equipment

IT has been learned unofficially that the bids recently received for the construction of floating equipment for the Pennsylvania Railroad Company, Philadelphia, Pa., have been rejected and that new bids covering the work may be called for within a short time.

The equipment required by the Pennsylvania Railroad Company, on which specifications were issued, includes: Six carfloats, each 250 feet in length and of 10-car capacity; 6 carfloats, each 330 feet in length and of 20-car capacity; two tugboat hulls, each 105 feet long, and one steam lighter 110 feet long.

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Great Lakes Engineering Works to Build 202 Foot Automobile Ferryboat of 60 Car Capacity

A CONTRACT for the construction of a third ferryboat to ply the Straits of Mackinac was recently awarded to the Great Lakes Engineering Works, River Rouge, Mich., at a price of $325,000. The new vessel will be 202 feet long, 48 feet beam and will accommodate 60 automobiles. The state administrative board of Michigan awarded the contract.

Plans Under Way to Rebuild S.S. Iroquois as 50 Car Automobile Ferryboat

PLANS for converting the steamship *Iroquois* of the Puget Sound Navigation Company, Seattle, Wash., into an automobile ferryboat for operation between Seattle and Victoria, are now being prepared by Lee and Brinton, Seattle naval architects. The *Iroquois* arrived in Seattle recently from the Great Lakes.

The *Iroquois* will have a capacity of 50 automobiles and will replace the steamship *Sol Duc* in the Seattle-Victoria route. It is estimated that the alterations will cost $150,000.

Diesel Yacht Contract Awarded to George Lawley Yard

IT IS understood that the firm of Henry J. Gielow, Inc., New York, has recently awarded a contract for the construction of a 115-foot Diesel yacht to the firm of George Lawley and Son Corporation, Neponset, Mass. This yacht will be powered by Bessemer Diesel engines.

In addition to its other work, the firm of Henry J. Gielow, Inc., is preparing plans and specifications for the construction of a 250-foot yacht. No further information on the particulars of the boat are available at this time.

Robins Drydock to Repair S.S. Norfolk

A CONTRACT for repairs to the steamship *Norfolk*, of 3,521 gross tons, owned and operated by the Coastwise Transportation Corporation, Boston, Mass., has been awarded to the Robins Drydock and Repair Company, Brooklyn, New York, at a price of $14,600 and a time of 8 continuous running days, bids for which were recently received. Four other tenders were submitted as follows:

Name	Price	Days
Morse Drydock and Repair Company	$14,537	14
Tietjen and Lang Drydock Company	15,750	9
James Shewan and Sons, Inc.	16,994	10
W. and A. Fletcher Company	17,814	13

American Bridge Company To Build Ten Barges

A CONTRACT for the construction of 10 steel barges has been awarded to the American Bridge Company, Ambridge, Pa., by the Carnegie Steel Company, Carnegie Building, Pittsburgh, Pa., at a price of about $180,000. The barges are to be 11 feet by 26 feet by 175 feet.

Long Island Railroad Asks Bids for Carfloat

PLANS and specifications have been sent out by the Long Island Railroad Company, New York, for the construction of one transfer carfloat. This float will have a length of 330 feet and will be of the three-track type. It will have a capacity for about 20 cars.

Additional Improvements in Accommodations on Liner America to be Made

ADDITIONAL improvements to the staterooms and other passenger accommodations of the steamship *America*, which is being reconditioned at Newport News for service on the United States Lines, have been authorized by the Shipping Board. The improvements authorized are in addition to those previously planned for in reconditioning the ship, and will result in making the vessel one of the finest and most luxuriantly appointed cabin vessels in the North Atlantic passenger service.

The reconditioning of the steamship *America* is rapidly nearing completion and the vessel is expected to make a sailing in March.

Order Placed With Crandall Engineering Company for 2,100 Ton Railway Drydock

THE Crandall Engineering Company, consulting and constructing engineers, 102 Border street, East Boston, Mass., has received a contract from the Lago Oil and Transport Company for a railway drydock of 2,100 tons lifting capacity, to be constructed at San Nicholas Bay, Aruba, D. W. I.

This drydock is a part of the project of the Lago Oil and Transport Company in establishing at San Nicholas Bay a station for the storage of oil from their wells in Venezuela, for reshipment to various parts of the world. It is designed especially to take care of a fleet of 15 tankers and is to have a lifting capacity of 2,100 long tons and a breadth of 60 feet. The underbody of the cradle will be of steel construction and the upper part of timber construction. It will be powered by a standard Crandall railway hoist and manganese steel hauling chains, capable of hauling out a capacity load in less than 30 minutes.

S. S. Hoover and Mason Will Be Reconstructed as Self-Unloader

THE 5,841 gross-ton steamship *Hoover and Mason* of the Duluth Steamship Company, Cleveland, Ohio, will be reconstructed during the winter at the Lorain yard of the American Shipbuilding Company, and when the vessel comes out next season she will be a self-unloader. Another Cleveland steamer of fair size may be changed to a self-unloader during the winter.

Bids to be Asked for 20 Pontoons

THE United States Engineer Office, Washington, D. C., is planning the construction of 20 steel pontoons. Further details are not as yet available.

House Passes Bill to Condition S.S. Mount Vernon and S.S. Monticello

ON Tuesday, January 24, the House passed a bill carrying appropriations for $12,000,000 for reconditioning the steamships *Mount Vernon* and *Monticello* (formerly the *Agamemnon*) in addition to $1,400,000 for reconditioning cargo ships for use in the export coal trade.

Estimates indicate that the *Mount Vernon* and *Monticello* would earn approximately $400,000 a year after reconditioning and in addition would provide the United States Lines with a more balanced fleet, enabling the establishment of a weekly service to European ports.

General Repairs to M. S. Tydol to be Carried Out at Morse Yard

THE Tidewater Oil Company, 11 Broadway, New York, has awarded a contract to the Morse Drydock and Repair Company, Brooklyn, New York, covering general repairs to the motorship *Tydol*, bids for which were recently received. The bids submitted were as follows:

Name	Price	Continuous running days
Morse Drydock and Repair Company	$20,390	17
Robins Drydock and Repair Company	23,610	18
Todd Shipyards Corporation	23,670	22
Tietjen and Lang Drydock Company	24,910	23
New York Harbor Drydock Company, Inc.	26,620	22
Staten Island Shipbuilding Company	27,950	22

Morse Yard To Repair S. S. Silverbelle

A CONTRACT covering repairs to the steamship *Silverbelle* has been awarded to the Morse Drydock and Repair Company, Brooklyn, New York, by the Kerr Steamship Company, 44 Beaver street, New York, bids for which were recently received by the latter company. The bids were as follows:

Name	Price	Continuous running days
Morse Drydock and Repair Company	$10,695	12
Robins Drydock and Repair Company	10,710	10
Tietjen and Lang Drydock Company	11,540	11
New York Harbor Drydock Company, Inc.	15,808	17

Tietjen and Lang Yard Receives Contract on S. S. Lake Inglenook

A CONTRACT for repairs to the Newtex Line steamship *Lake Inglenook*, has been awarded to the Tietjen and Lang Drydock Company, Hoboken, N. J., at a price of $7,971 and a time of eight days. The bids for the work were received recently, and several other tenders were submitted as follows:

Name	Price	Days
Robins Drydock and Repair Company	$8,200	8
James Shewan and Sons, Inc.	8,900	12
New York Harbor Drydock Company, Inc.	12,200	12
W. and A. Fletcher Company	15,814	12

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Construction and Repair Bids

Analysis of Shipping Board Auxiliary Diesel Engine Bids Not Yet Made

BIDS were opened on Wednesday, January 18, covering the construction of 16 auxiliary Diesel engines, which are to be used by the United States Shipping Board for driving generators, compressors and pumps in the forthcoming program of converting Shipping Board vessels to Diesel drive. These bids were opened by Captain R. D. Gatewood, manager of the maintenance and repair division of the Shipping Board, 45 Broadway, New York.

Bids were submitted in such a form that no direct comparison is as yet possible in determining the relative prices for equivalent equipment. An analysis is being made at the present time by the staff so that within a short time figures will be available for publication. As soon as this has been done and recommendation submitted to the Shipping Board commissioners, contracts will be awarded, it being the intention to push the work to completion as rapidly as possible.

Bids Opened for Carfloats, Barges and Scows for New York Central R. R.

TENDERS were received and opened at the offices of the purchasing agent New York Central Railroad, 466 Lexington avenue, New York, on January 14, for the construction of four steel carfloats, ten gasoline hoist barges and five scows, with the following results:

FOUR 270-FOOT STEEL CARFLOATS

Name	Price (each)	Time (months)
Dravo Contracting Company..	$100,000	8½
American Brown Boveri Electric Corporation	111,060	6
Bethlehem Shipbuilding Corporation, Ltd.	112,860	6¾
Newport News Shipbuilding and Drydock Company	120,600	6½
Federal Shipbuilding Company	122,000	9
Charleston Drydock and Machine Company	134,056	21
Sun Shipbuilding and Drydock Company	162,000	6 2/3

FIVE SCOWS

Name	Price (each)	Time (months)
Brewer Drydock Company....	$ 27,075	7
Charleston Drydock and Machine Company	30,141	17
Staten Island Shipbuilding Company	30,600	4 2/3
Dravo Contracting Company..	31,250	5½
Atlantic Basin Iron Works Corporation	34,650	5
Federal Shipbuilding Company.	35,000	9
The Maryland Drydock Company	36,367	6
Bethlehem Shipbuilding Corporation, Ltd.	37,900	6
Newport News Shipbuilding and Drydock Company	39,000	7
American Brown Boveri Electric Corporation	39,900	5
Crowinshield Shipbuilding Company	43,580	8
Todd Shipyards Corporation...	44,390	8

TEN GASOLINE HOIST BARGES

Name	Price (each)	Time (months)
Brewer Drydock Company....	$ 32,850	8
Charleston Drydock and Machine Company	35,994	17
Staten Island Shipbuilding Company	38,300	10¾
Dravo Contracting Company..	38,650	7½
Maryland Drydock Company..	42,820	7½
Federal Shipbuilding Company	43,000	14
Atlantic Basin Iron Works Corporation	43,500	7
Newport News Shipbuilding and Drydock Company	44,000	10
Bethlehem Shipbuilding Corporation, Ltd.	46,470	11
American Brown Boveri Electric Corporation	48,700	6
Todd Shipyards Corporation...	51,165	13

Information has been received from officials of the New York Central Railroad that no decision on the award of contracts covering the above work will be made for two or three weeks. It may be possible that the present bids will be rejected and the specifications will be modified and sent out again for revised bids. Further information will be available later.

Bids for Repairs to S.S. Bakersfield Opened

WITH a price of $14,265, the Morse Drydock and Repair Company, Brooklyn, New York, submitted the lowest proposal covering repairs to the steamship *Bakersfield* of the United States Shipping Board, bids for which were received on January 23. Other tenders received were:

Name	Price
New York Harbor Drydock Company, Inc.	$15,687
Robins Drydock and Repair Company.	16,750
W. and A. Fletcher Company.....	17,815
Staten Island Shipbuilding Company..	21,981
James Shewan and Sons, Inc.....	22,097

Bids Received for Construction of 80 Steel Pontoons

TENDERS were received and opened at the office of the District Engineer, Mississippi River Dredging District, Box 1017, Memphis, Tenn., for furnishing 80 steel pontoons, with the following results. The proposal of the Mississippi Valley Structural Steel Company $32,000 was recommended for award.

Name of bidder	Welded or riveted	Delivery time and place	Price bid
The Novelty Steam Boiler Wks. Co., Baltimore, Md.	Riveted	180 days (b)	$73,496.00
Howard Ship Yards & Dock Co., Jeffersonville, Ind.	Riveted	160 days (a)	62,943.00
Tippett & Wood, Inc., Phillipsburg, N. J.	Riveted	75 days (b)	64,750.00
Tippett & Wood, Inc., Phillipsburg, N. J.	Riveted	75 days (c)	66,300.00
Nashville Bridge Co., Nashville, Tenn.	Comb. welded and riveted	130 days (a)	35,440.00
Dan Shea Boiler Works, Memphis, Tenn.	Riveted	120 days (b)	34,000.00
Miss. Valley Structural Steel Co., St. Louis, Mo.	Welded	150 days (b)	32,000.00
Welded Products Co., Birmingham, Ala.	Riveted	95 days (b)	48,960.00
Welded Products Co., Birmingham, Ala.	Riveted	95 days (c)	49,440.00
Welded Products Co., Birmingham, Ala.	Welded	70 days (b)	40,800.00
Welded Products Co., Birmingham, Ala.	Welded	70 days (c)	41,200.00
St. Louis Structural Steel Co., St. Louis, Mo.	Riveted	140 days (a)	44,800.00
St. Louis Structural Steel Co., St. Louis, Mo.	Welded	140 days (a)	41,040.00
Chris Rehkopf Boiler & Tank Wks., Memphis, Tenn.	Riveted	150 days (a)	48,259.44
Dubuque Boat & Boiler Co., Dubuque, Iowa.	Riveted	90 days (a)	41,440.00
The Biggs Boiler Works Co., Akron, Ohio.	Riveted	120-240 days (a)	49,960.00
Witt-Humphrey Steel Co., Greensburg, Pa.	Riveted	70 days (a)	35,968.00
Vulcan Iron Works, Wilkes-Barre, Pa.	Riveted	120 days (b)	65,280.00
Lakeside Bridge & Steel Co., North Milwaukee, Wis.	Riveted	110 days (b)	64,310.00
Lakeside Bridge & Steel Co., North Milwaukee, Wis.	Welded	110 days (b)	51,780.00
James McNeil & Bro. Co., Pittsburgh, Pa.	Riveted	100 days (b)	142,400.00
Lancaster Iron Works, Inc., Lancaster, Pa.	Riveted	Not std. (b)	58,160.00
The Reeves Brothers Co., Birmingham, Ala.	Riveted	120 days (b)	62,640.00
R. S. Newbold & Son Co., Norristown, Pa.	Riveted	180 days (c)	44,000.00
Milwaukee Bridge Co., Milwaukee, Wis.	Riveted	120 days (b)	53,890.00
Fowler Wolfe Boiler Works, Paducah, Ky.	Riveted	195 days (a)	65,800.00
The New York Central Iron Wks. Co., Inc., Hagerstown, Md.	Riveted	160 days (b)	59,000.00
John O'Brien Boiler Works Co., St. Louis, Mo.	Riveted	150 days (b)	52,800.00
Jones & Laughlin Steel Corp., Pittsburgh, Pa.	Riveted	100 days (a)	41,800.00
Riter-Conley Co., Pittsburgh, Pa.	Riveted	70 days (a)	47,200.00
Riter-Conley Co., Pittsburgh, Pa.	Riveted	90 days (b)	54,960.00
Greenville Boiler & Mach. Wks., Greenville, Miss.	Riveted	320 days (c)	83,200.00
Mid-West Boat & Barge Co., Inc., Grafton, Ill.	Riveted	180 days (a)	44,000.00
Midland Barge Co., Midland, Pa.	Riveted	120 days (a)	49,600.00
Zier Boiler & Sheet Iron Co., New Albany, Ind.	Riveted	120 days (a)	39,300.00
Chas. Hegewald Co., New Albany, Ind.	Riveted	300 days (a)	47,200.00
American Bridge Co., Pittsburgh, Pa.	Riveted	Not std. (a)	54,800.00
Ayer & Lord Tie Co., Chicago, Ill.	Riveted	165 days (a)	64,472.00
The Dravo Contracting Co., Pittsburgh, Pa.	Riveted	135 days (a)	49,600.00
The Dravo Contracting Co., Pittsburgh, Pa.	Welded	150 days(a)	44,800.00

Bids Received for Construction of Diesel Yacht

BIDS have been received for the construction of a 150-foot Diesel yacht designed by John H. Wells, naval architect, 11 East 44th street, New York, but the award of this contract is pending the return of the owner from Europe. There will probably be some delay in the award of the contract as the vessel is not scheduled for delivery until 1929.

Bids for Repairs to Shipping Board Steamers

THE United States Shipping Board received and opened bids recently for repairs to the steamship *Highо* and the Atlantic Basin Iron Works Corporation, Brooklyn, New York, was awarded the contract at a price of $2,394. Three other proposals were received for the work as follows:

Name	Price
Morse Drydock and Repair Corporation..	$ 2,956
Staten Island Shipbuilding Company.....	3,247
Robins Drydock and Repair Company...	3,420

Six shipyards submitted proposals on Wednesday, January 11, covering general repairs to the Shipping Board steamship *Algic*, with the following results:

Name	Price
New York Harbor Drydock Company, Inc.	$ 6,647
Morse Drydock and Repair Company....	7,096
W. and A. Fletcher Company.....	7,100
Robins Drydock and Repair Company...	7,220
Theodore A. Crane's Sons Company....	9,495
James Shewan and Sons, Inc.....	9,981

Bids Opened for Repairs to S.S. Western World

TENDERS were received and opened at the offices of the Munson Steamship Line, 67 Wall street, New York City, recently, covering repairs to the steamship *Western World*, with the following results:

Name	Price
Westinghouse Electric and Manufacturing Company	$5,425
Atlantic Basin Iron Works Corporation..	5,975
Tietjen and Lang Drydock Company.....	7,470

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U. S. Engineers at Philadelphia Will Soon Order Dredge

INFORMATION has been received that the United States Engineer Office, Philadelphia, Pa., is planning the construction of a hydraulic dredge. Further information will be available shortly.

Bids Asked on New Hull

THE Mississippi River Commission, First and Second Districts, Memphis, Tenn., will receive sealed proposals until 11:00 A. M., February 7, 1928, for the construction and delivery, f.o.b. builder's shipyard, of one steel hull. Further information may be obtained upon application.

S.S. City of Joliet Repair Bids Opened

THE United States Shipping Board, 45 Broadway, New York, received tenders on January 20, covering repairs to the steamship *City of Joliet* and the New York Harbor Drydock Company, Inc., New York, was low bidder for the work with a price of $26,000. Other bids received were:

Name	Price
Staten Island Shipbuilding Company	$30,889
Robins Drydock and Repair Company	31,800
Morse Drydock and Repair Company	32,722
W. and A. Fletcher Company	32,800
Federal Shipbuilding Company	36,740

The contract has not as yet been placed.

S.S. Nobles to be Repaired at Tietjen and Lang Yard

THE Export Steamship Corporation, 25 Broadway, New York, has awarded the contract for repairing the steamship *Nobles* to the Tietjen and Lang Drydock Company, Hoboken, N. J., at a price of $8,103. Other tenders received for the work include:

Name	Price
Robins Drydock and Repair Company	$ 8,563
Todd Drydock, Engineering and Repair Corporation	8,950
Morse Drydock and Repair Company	9,965
N. Y. Harbor Drydock Company, Inc.	14,950
James Shewan and Sons, Inc.	14,950
Staten Island Shipbuilding Company	15,550
W. and A. Fletcher Company	16,300

Bids for Two Wooden Deck Barges

WITH a price of $11,800. the Murnan Shipbuilding Corporation, Mobile, Ala., submitted the lowest tender for the construction of two creosoted wooden decked barges for the United States Engineer Office, Montgomery, Ala., bids for which were received at Montgomery last month. The boats are to have a length overall 80 feet; breadth, outside of planking 25 feet; breadth, overall, 25 feet 7¼ inches; depth at side over planking 4 feet 8 inches; depth at center line over planking 5 feet, and camber in 25 feet, 4 inches.

Other proposals received for the work were:

Name	Price
J. Olson and Son, Jacksonville, Fla.	$13,600
Higgins Lumber and Export Company, New Orleans, La.	15,500
T. M. Favre, Gulfport, Miss.	17,162
Alabama Dry Dock and Shipbuilding Company, Mobile, Ala.	18,348
Charleston Drydock and Machine Company, Charleston, S. C.	20,339

The award has not as yet been made.

Tugboat L. D. Potter Repair Bids

THE W. and A. Fletcher Company, Hoboken, N. J., was low bidder for reconditioning the Newtown Creek Towing Company's tugboat *L. D. Potter,* at the opening of bids at New York recently. The proposals submitted were as follows:

Name	General Contract	Separate Prices not included in General Contract	Time (days)
W. and A. Fletcher Company	$29,723	$16,763	40
Theodore A. Crane's Sons Company	28,041	25,268	60
Tietjen and Lang Drydock Company	35,385	19,600	60
Robins Drydock and Repair Company	35,925	21,080	59
Morse Drydock and Repair Company	37,680	14,528	50
Clinton Drydocks, Inc.	37,800	19,725	54
Staten Island Shipbuilding Company	39,073	22,392	33
New York Harbor Drydock Company, Inc.	42,500	25,300	35
Perth Amboy Drydock Company	41,200	24,400	37

The award has not as yet been made.

World's Shipbuilding Increasing

WORLD shipbuilding starts the year with a further increase in the volume of merchant tonnage under construction, says a statement just issued by Lloyd's Register of Shipping, based on returns from all maritime countries for the quarter ended December 31, last.

The total now reported for the world, 3,118,000 gross tons, is an advance of 44,000 gross tons over the figure at the end of the preceding quarter, which, in turn, showed an advance of 234,000 tons over the June quarter. As compared with the volume of work at the end of December, 1926, quarter, however, the present figures mark a gain of nearly 1,200,000 gross tons, and are not far below the total for the pre-war quarter of June 30, 1914 of 3,162,000 tons. The quarterly gains have now been unbroken since September, 1926.

A general comparison between the last two quarters is given in the following table, the figures representing gross tons:

	Dec. 31, 1927	Sept. 30, 1927
Great Britain and Ireland	1,579,713	1,536,416
United States	97,370	91,070
Other countries	1,441,638	1,446,571
World total	3,118,721	3,074,057

In addition to the gains for Great Britain and Ireland, and the United States, construction increases were reported for Holland, Denmark, Sweden, Russia and Japan. Sweden is now building more tonnage than the United States. Germany shows a decrease of 44,000 gross tons from the figure for the September quarter; Italy, one of 25,000 tons; and France of 15,000 tons. Great Britain and Ireland, alone, are now building more merchant shipping than all the other maritime countries combined.

No change is shown in the ranking of the leading shipbuilding nations during the quarter ended December 31. Great Britain and Ireland, Germany, Italy, Holland and France retaining their positions in the order named. Sweden, however, which stood eighth in the September quarter, with 82,000 gross tons, is now sixth, with 100,700 tons. As a result, Denmark drops from sixth to seventh place and the United States from seventh to eighth; with Russia and Japan retaining ninth and tenth places.

Tonnage Launched Exceeds New Work

While merchant steamers and motorships launched throughout the world showed a marked increase during the December quarter over the September one, there was a decrease in the volume of new work begun. The effect is a reversal of the conditions prevailing in other recent quarters, so that work being sent towards completion during the last quarter was in excess of the new construction started. In the September quarter, the new work begun in all maritime countries aggregated 760,930 gross tons, as against 526,157 tons of launchings.

Tanker Tonnage Decreases

A decrease in the construction of tankers of 1,000 tons gross and above is reported by Lloyd's to have occurred during the December quarter. This is accounted for by a decline in this class of work in Great Britain and Ireland; the figures for the United States and the other maritime countries combined showing a gain. Sweden alone, now has 83,300 gross tons of tank vessels building. It is noted, however, that the tanker tonnage now being constructed is more than double what it was a year ago, at which time only 371,520 gross tons were building.

Motorship Tonnage Still Gains

Another gain, although not a large one, is shown in the returns of motorship construction. Under the present status, 100,000 gross tons more of this type of shipping are being built than of all other types combined. While the December quarter showed an increase of only 20,000 gross tons over the preceding one, the present total of more than 1,600,000 tons is over 700,000 tons greater than the aggregate building a year ago.

Further evidence of the increasing use of vessels equipped for motor propulsion is furnished by Lloyd's returns of the power of various types of marine engines being built or installed in all countries. Again the figures for oil engines show a gain over the previous quarter.

Engine Construction

For the quarter ended December 31 last, the total indicated horsepower of oil engines in hand for marine use was 1,233,956, as against 1,161,630 for the previous quarter. Of the present total, 373,341 is for the shipping in the yards of Great Britain and Ireland, compared with the September figure of 356,440; and 860,615 for the other maritime countries combined, as against 807,190 in September quarter.

Germany is represented in the present figures with an indicated horsepower of 241,300; and Italy with 161,050. A year ago, the power of all oil engines being built or installed in the world for marine purposes was nearly 400,000 indicated horsepower less than now.

A slight decline is shown in the figure for the indicated horsepower of steam reciprocating engines, in comparison with the September quarter, the December total for all countries, being 556,874, as against 568,969 for the previous period. For great Britain and Ireland, Lloyd's returns show an increase from 394,224 indicated horsepower to 405,984; but this was offset by a decline from 174,745 to 150,890 for the other countries combined.

There was a gain reported in the figures covering the shaft horsepower of steam turbines being built or installed; the total advancing from 309,900 in the September quarter for all countries, to 343,700 in the December period. The figures exclude Germany, returns for which are not available.

A contrast of present conditions in ship

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construction with that of a year ago, made by Lloyd's Register, shows that Great Britain and Ireland, Germany, Denmark and Sweden have more than doubled the tonnage in hand at the beginning of 1927. Holland, Russia and Japan show lesser gains; while the United States, Italy and France are building less than they were a year ago.

RELATIVE POSITION OF VARIOUS COUNTRIES

The relative position of the various countries is shown in the following table of gross tonnage for the two periods:

	Dec. 31, 1927	Dec. 31, 1926
Great Britain and Ireland	1,579,713	760,084
Germany	472,295	211,062
Italy	183,216	239,776
Holland	174,887	145,005
France	115,029	143,068
Sweden	100,700	39,127
Denmark	97,710	41,142
United States	97,370	151,635
Russia	87,658	54,420
Japan	68,870	43,060

Many changes in relative ranking occurred throughout the year, Lloyd's Register points out; Great Britain and Ireland, which held the lead throughout, being the only ones whose position was not shifted during the period. Germany, by advancing from third place to second, changed positions with Italy. Holland rose from fifth to fourth and France from sixth to fifth. Sweden came from tenth place to sixth and Denmark from ninth to seventh. The United States dropped from fourth to eighth; Russia from seventh to ninth, and Japan from eighth to tenth.

Sea Trials of Diesel Electric Tug Boat Chagres

SUCCESSFUL trials were recently held on the tug boat *Chagres*, which is the first Diesel electric boat built for service in the Canal Zone. The tests included dock trials in which the *Chagres* developed a tow rope pull of 27,500 pounds, which was a 25 percent higher load than was expected. On the sea trials between Pachea Island and Bona Island, the boat maintained a speed of 13½ knots.

Both the *Chagres* and her sister tug the *Trinidad*, which is nearing completion, are the two largest Diesel electric tug boats in the world and the only craft of their type in Central and South America.

Each boat is powered with two 480 brake horsepower marine oil engines built by the Ingersoll-Rand Company, New York. Each engine is direct connected to a generator and exciter, which supply current to a single propelling motor. The electrical equipment was supplied by the General Electric Company, Schenectady, N. Y.

The boats were built by the Mechanical Division of the Canal Zone.

Another Record

THE tug *Susan A. Moran* of the Moran Towing & Transportation Company, Inc., 17 Battery Place, New York, arrived at Mariel, Cuba, at 10 A. M., January 18 with the newly constructed steel cement barge of the International Cement Corporation in tow from Camden, New Jersey. This service was performed in 7 days and 7 hours.

James R. White, formerly vice president of Rickard and Company, industrial advertising agents, has resigned from that position to become secretary of Jenkins Bros., valve manufacturers, with headquarters at 80 White street, New York.

Shipping Board Honor Roll for the First Six Months of 1927

THE fuel conservation committee of the United States Shipping Board Merchant Fleet Corporation has announced an Honor Roll of Chief Engineers and masters of the fifty best performing vessels in the Shipping Board fleet for the six-month period January 1, 1927, to June 30, 1927. This honor roll was established as a means of stimulating competition among the various Shipping Board vessels, with the view to improving the economy of their performance. Each chief engineer and master whose name appears on this honor roll receives a bonus of $50 from the Shipping Board in recognition of their efforts in establishing a record for their vessel which entitles it to this listing.

To secure a place on this honor roll a vessel must have traveled at least 20,000 miles during the six-month period covered and must have maintained a combined port and sea efficiency rating of 95 percent or better, it being necessary to have a rating of at least 95 percent of that of the leader of the particular class or type of vessel in which the ship falls. The charges for maintenance must have been reasonable and the physical condition and cleanliness of both deck and engine departments must have been first class. There are a number of vessels whose performance might ordinarily entitle them to listing on the honor roll, but, as the roll is limited to the fifty best vessels, they have fallen just short of this mark. However, to afford them recognition for their efforts to maintain efficient operation there has been established an honorable mention roll consisting of forty-four vessels whose performance is almost of that calibre which would entitle them to listing on the honor roll.

Of the fifty vessels on the honor roll two have been listed on five previous occasions, five have been on four times before, six have appeared on three other honor rolls, nine are listed for the third time, and thirteen are on for the second time. Fifteen, of which five have previously appeared on the honorable mention list, are on the honor roll for the first time.

Twenty-one chief engineers are listed for the first time, twelve of them having been honorably mentioned before. Eleven appear for the second time, five for the third and six for the fourth time. Four chiefs have been listed on four previous occasions and three have been on the five previous honor rolls.

This honor roll is based upon the analysis of the performance records of 343 vessels. During this period these vessels have traveled a total of 7,422,422 miles in 30,503 days, which gives an average speed of 10.14 knots. There have been a total of 22,841 days spent in port.

Although the mileage shows an increase of 23.6 percent over the corresponding period in 1926, the total fuel consumption at sea has only increased 19 percent and the average speed is practically the same. The total fuel consumption in port shows an increase of 3 percent, but the total time in port increased 5 percent. This amounts to a saving on fuel costs of $27,111 for this period over the 1926 period.

The saving shown this time is somewhat less than savings shown on previous honor rolls, but the performance of the fleet has improved so much in the last few years that it has reached a point where further improvement is difficult of attainment. Furthermore, the improvement during this period was in spite of the fact that the performance records include those of a large number of ships broken out of lay-up for one or two voyages to relieve the shipping congestion of last winter and spring. The performance of a vessel taken out for one or two voyages and then returned to lay-up is naturally not as good as the performance of a vessel in continuous service and it is the continued good performance of the active fleet that has saved more fuel than the emergency ships have lost.

This good performance is the result of intelligent and industrious efforts of the operating personnel of these vessels and the port staffs of the various operating companies in cooperating with the fuel conservation committee in its work to establish a high efficiency of operation.

Honor Roll *

America France Line.—S. S. *Liberty*, P. G. Lockhard, chief engineer; L. Inordskog, Master. S. S. *Waukegan* (4), E. Hamilton, (2) chief engineer; Clifton Smith, master.

American Australia Orient Line.—S. S. *West Islip* (1), L. A. Gender (1), chief engineer; A. J. Larson, master. S. S. *Montague*, R. Walgren, chief engineer; O. Lee, master.

American Diamond Lines.—S. S. *Innoko* (1), George Merkle, chief engineer; H. Kiehne, master.

American Dixie Line.—S. S. *Jolee* (2), E. Tillotson (1), chief engineer; H. Muller, master. S. S. *Labette* (1), E. Glaze, chief engineer; W. Haby, master. S. S. *West Ekonk* (2), T. Sheridan, (5) chief engineer; H. Simons, master. S. S. *West Modus* (1), J. R. Cotie (1), chief engineer; E. M. Roupe, master. S. S. *West Wauna* (2), R. L. Leach (3), chief engineer; J. C. Wenzel, master. S. S. *Colorado Springs* (5), N. Hendrickson (5), chief engineer; H. O. Weatherbee, master.

American India Line.—S. S. *Algic* (4), G. M. Gustavson, chief engineer; L. Peterson, master.

American Merchant Lines.—S. S. *Lehigh* (3), S. J. Miller (3), chief engineer; C. F. Peterson, master. S. S. *American Farmer* (2), H. E. Comstock (2), chief engineer; H. S. Myddleton, master. S. S. *American Shipper*, W. O. Swatridge, chief engineer; S. F. Cumings, master.

American Pioneer Line.—S. S. *Invincible* (1), L. Augustine (3), chief engineer; F. Ulstad, master.

American Premier Line.—S. S. *Jolee* (2), E. Tillotson (1), chief engineer; H. Muller, (5), master S. S. *Quistconck* (2), C. B. Brown (2), chief engineer; G. Olofson, master.

American Republics Line.—S. S. *Culberson* (3), S. O. Clare (1), chief engineer; W. H. Harsted, master. S. S. *West Calumb* (1), P. McComb, chief engineer; J. A. Storm, master.

American Scantic Line.—S. S. *Schenectady*, E. W. Lotz (1), chief engineer; H. Mayo, master.

American West African Line—S. S. *West Humhaw*, E. E. Albrecht, chief engineer; F. Seay, master.

Atlantic Australian Line.—S. S. *Eastern Planet* (4), W. Richards (4), chief engineer; R. Rose, master. M. S. *Crown City*, D. J. Cody (1), chief engineer; H. Ricca, master. M. S. *West Cusseta*, A. J. Pancott (2), chief engineer; J. D. Scofield, master.

Gulf West Mediterranean Line.—S. S. *Cardonia* (3), J. L. Dalton (3), chief engineer; W. B. Zeckel, master. S. S. *Jomar* (2), C. E. Pepper (1), chief engineer; D. E. Griffin, master. S. S. *Lafcomb*, J. McKerrall (4), chief engineer; A. J. Johannessen, master, S. S. *Ogontz* (3), B. Von Hein (3), chief engineer; B. J. Cheshire, master. S. S. *West Chetac* (1), J. B. Peel (1), chief engineer; J. M. Dunn, master.

Mississippi Valley European Line.—S. S. *Syros*, H. Hammeros, chief engineer; J. D. Pearson, master.

Mobile Oceanic Line.—S. S. *Afoundria* (1), J. L. Jones, chief engineer; R. L. Hooper, master. S. S. *West Hardaway* (4), J. Sherlock (4), chief engineer; R. G. Dobbin, master. S. S. *West Hika* (2), G. P. Hill (1), chief engineer; R. N. Sweeting, master. S. S. *Antinous* (4), M. Breisten (4), chief engineer; D. A. Stewart, master. S. S. *Hastings*, R. T. Lemon, chief engineer; I. Hystad, master.

Oregon Oriental Line.—S. S. *West Kader*, E. F. Gratton, chief engineer; C. T. Wrucke, master. S. S. *Las Vegas*, J. W. Shaver, chief engineer; J. W. Wilkie, master.

Oriole Lines.—S. S. *Hoxie* (1), W. A. Grenz chief engineer; M. T. Lewis, master.

Southern States Line.—S. S. *Chester Valley* (1), R. Scott, chief engineer; C. T. McMains, master. S. S. *Cody* (2), E. S. Rasmussen, chief engineer; E. J. Madden, master. S. S. *Conness Peak* (1), Thomas Jerret, chief engineer; C. P. Townsend, master. S. S. *Endicott* (1), R. S.

* Figures in parentheses indicate the number of previous honor rolls on which the vessel or chief engineer, as the case may be, has been listed.

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Hendrickson, chief engineer; Wm. Henderson, master. S. S. *Aquarius* (3), F. Fredrickson, (3), chief engineer; W. H. Stone, master.

Struthers & Barry.—S. S. *Dilworth*, R. G. Ramsey, chief engineer; K. I. Hogstrom, master

Texas Star Line.—S. S. *Chester Valley* (1), R. Scott, chief engineer; C. T. McMains, master. S. S. *Cliffwood* (3), I. Birks (1), chief engineer; N. L. Proctor, master. S. S. *Cody* (2), E. S. Rasmussen, chief engineer; E. J. Madden, master. S. S. *Conness Peak*, Thomas Jerret, chief engineer; C. P. Townsend, master. S. S. *Westmoreland* (1), P. Thompson (1), chief engineer; J. V. Smith, master. S. S. *Endicott* (1), R. S. Hendrickson, chief engineer; W. M. Henderson, master. S. S. *Waban*, H. Grotemat, chief engineer; J. W. Blackwood, master.

United States Lines.—S. S. *Leviathan* (5), J. J. Fagan (5), chief engineer; H. Hartley, master. S. S. *Republic* (2), A. W. Styron (2), chief engineer; A. B. Randall, master.

Yankee Line.—S. S. *Seattle Spirit*, E. H. Draper, chief engineer; G. V. Hedman, master.

Honorable Mention

American Australia Orient Line.—S. S. *West Calera*, H. George, chief engineer; H. Hansen, master. S. S. *West Nivaria*, R. E. George, chief engineer; H. N. Krog, master. S. S. *Elkridge*, E. Troski, chief engineer; J. T. Flynn, master. S. S. *West Chopaka*, E. C. Matheson, chief engineer; C. H. Bruun, master.

American Diamond Lines.—S. S. *Western Ally*, G. Poortvliet, chief engineer; E. W. Carver, master. S. S. *Bellepline*, J. S. Bishop, chief engineer; S. F. Ing, master. S. S. *Wytheville*, J. A. Bruno, chief engineer; J. T. Hokinson, master.

American Dixie Lines.—S. S. *West Hobomac*, C. A. Adams, chief engineer; C. H. Hewlett, master. S. S. *Duquesne*, L. V. LeBeuf, chief engineer; G. D. Tipton, master. S. S. *Cripple Creek*, C. M. Fredrickson, chief engineer; J. P. Forrest, master. S. S. *Abercos*, C. Anderson, chief engineer; O. H. Olsen, master.

American India Line.—S. S. *Egremont*, J. E. Turpin, chief engineer; D. Holt, master.

American Merchant Lines.—S. S. *City of Flint*, E. Kearney, chief engineer; T. Thomassen, master.

American Palmetto Line.—S. S. *Cold Water*, E. J. Riggs, chief engineer; A. C. Forward, master.

American Pioneer Line.—S. S. *The Lambs*, W. H. Zigler, chief engineer; S. C. Fenn, master. S. S. *Eclipse*, E. J. Brenson, chief engineer; D. A. Smith, master. S. S. *Independence*, J. Stawicke, chief engineer; J. L. Jones, master. S. S. *Ethan Allen*, E. H. Knee, chief engineer; A. C. Iverson, master. S. S. *Liberator*, N. Johnson, chief engineer; C. D. Smith, master.

American Premier Line.—S. S. *West Hobomac*, C. A. Adams, chief engineer; C. H. Hewlett, master.

American Republics Line.—S. S. *St. Anthony*, H. P. Saxe, chief engineer; C. B. Delaney and A. P. Spaulding, masters. M. S. *Tampa*, W. C. Dowe, chief engineer; P. P. Taylor, master.

American West African Line.—S. S. *West Nohno*, E. L. Johnson, chief engineer; E. W. Meese, master. S. S. *Cathlamet*, F. B. Auld chief engineer; R. S. Sparrow, master.

Gulf West Mediterranean Line.—S. S. *West Chatala*, S. T. Pritchett, chief engineer; I. M. Holt, master.

Mississippi Valley European Line.—S. S. *Carplaka*, A. Isaacson, chief engineer; H. P. Smith, master. S. S. *Cold Brook*, W. H. Evans, chief engineer; H. Fahrenwald, master. S. S. *Cranford*, P. J. Battam, chief engineer; G. H. Steel, master.

Mobile Oceanic Line.—S. S. *Maiden Creek*, P. Calagez, chief engineer; E. L. Wheadon, master.

Oriole Lines.—S. S. *Coelleda*, L. Henkel, chief engineer; C. Hillyer, master. S. S. *West Noska*, C. Rice, chief engineer; E. W. Hickey, master. S. S. *Clairton*, J. D. Sylvester, chief engineer; J. M. Dunn, master.

Southern States Line.—S. S. *City of Fairbury*, L. J. Swift, chief engineer; A. A. Colbury and G. H. Johnson, masters. S. S. *Saguache*, C. J. Spatz, chief engineer; E. Simpson, master. S. S. *Youngstown*, C. Crosier, chief engineer; Albin Johnson, master. S. S. *Effna*, A. L. Rosamond, chief engineer; H. S. Olsen, master. S. S. *Oakwood*, C. Walters, chief engineer; H. Ward, master. S. S. *Bayou Chico*, B. Trachtenburg, chief engineer; R. B. Armstrong, master. S. S. *City of Weatherford*, F. C. Gouner, chief engineer; J. P. Haarberg, master. S. S. *Emergency Aid*, F. S. Jurkowski, chief engineer; M. Cameron, master.

Texas Star Line.—S. S. *West Quechee*. C. M. Cobb, chief engineer; George Skene, master. S. S. *Youngstown*, C. Crosier, chief engineer; Albin Johnson, master.

United States Lines.—S. S. *George Washington*, W. G. Grace, chief engineer; H. Cunningham, master.

Yankee Line.—S. S. *West Pool*, R. H. Phinney, chief engineer; L. F. Thompson, master. S. S. *West Campgaw*, E. Innes, chief engineer; F. E. Hardy, master. S. S. *Lorain*, J. E. Miller, chief engineer; J. M. Caulk, master.

TRADE PUBLICATIONS

MOTORSHIP LALANDIA.—Burmeister and Wain, Ltd., Copenhagen, Denmark, has issued a catalogue devoted to a complete description of the 7,500-ton twin screw motorship *Lalandia* for the East Asiatic Company.

ELECTRICAL INSTRUMENTS.—The fourth edition of the general catalogue for the Weston Electrical Instrument Corporation of Newark, N. J., has been distributed to the marine field and contains descriptions of many devices of interest to marine engineers.

WHITE METALS AND BABBITT.—A. pamphlet has been issued by I. Shonberg, Inc., Brooklyn, N. Y., on white metals and babbitt, their origin, history and progress as well as the various alloys of such antifriction metals and contains data and information of interest to marine engineers.

FLEXIBLE METALLIC AND SEMI-METALLIC PACKINGS.—This bulletin distributed by the Flex Alloy Packing Company of Philadelphia contains a brief description of its standard and special packings. The product is put up in convenient forms of coils, spiral spool, ring and reel and has a feature of being made of finely drawn alloy wire, insulated, lubricated with graphite then woven and formed into triangular sections. Two sections are bound together with a closely woven cover.

CALENDAR.—A calendar has been issued by the Moran Towing and Transportation Company, Inc., of New York. Included in this calendar is a tide table for the locations of Sandy Hook, Governor's Island and Hell Gate Light.

DIESEL YACHTS.—The firm of Cox and Stevens, naval architects, New York, sent out a New Year's greeting in the form of a pamphlet illustrating and describing nine Diesel yachts that are now under construction from plans developed by the firm.

GASKETS.—A folder with price lists has been published by the Flexitallic Gasket Company of Camden, N. J. A description of the product shows that it is partially metal and asbestos, constructed in a flexible manner and applicable to pipe flanges, tube caps and manholes.

FILTERS FOR RECONDITIONING OILS.—The United Filters Corporation of Hazleton, Pa., has distributed a bulletin describing the type O. R. Kelly pressure filter which may be adopted by users of Diesel and other internal combustion engines for reconditioning crank case and other engine oils.

OXY-ACETYLENE WELDING.—The Air Reduction Sales Company, New York, has recently issued a reprint of a paper presented at the annual fall meeting of the American Welding Society. This paper entitled, "A Study of Oxy-acetylene Welding as Applied to Light Gage Pressure Containers" and written by H. J. Grow deals with the various metnods of setting up work, the difficulties and solutions of the problems encountered in welding tanks.

Marine Societies

America

American Marine Association. 30 Church St., New York. President—Col. E. A. Simmons.

American Marine Standards Committee. Chairman, Colonel E. A. Simmons. Secretary, A V. Bouillon, Division of Simplified Practice, Department of Commerce, Washington, D. C.

American Society of Marine Designers. Secretary—B. G. Barnes, 202 Kendrick Ave., Quincy, Mass.

American Society of Marine Engineers. 605 Market St., San Francisco, Calif. President—Henry F. Gelhaus. Secretary—Wm. H. Thille.

American Society of Naval Engineers. Navy Department, Washington, D. C. Secretary-Treasurer—Commander H. B. Hird, U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.

American Steamship Owners' Association. 11 Broadway, New York. President—H. B. Walker.

Atlantic Coast Shipbuilders' Association. 1600 Walnut Street, Philadelphia, Pa. Secretary C. S. King.

Council of American Shipbuilders, Inc. 50 Broadway New York. President—Homer L. Ferguson. Secretary-Treasurer—Henry C. Hunter.

Jersey Marine Club. 4th and River Streets, Hoboken, N. J. President—Col. Bartlett.

Lake Carriers' Association. President—J. S. Ashley. Secretary—George A. Marr, Rockefeller Building, Cleveland, O.

National Association of Engine and Boat Manufacturers. 29 West 39th Street, New York City. Secretary—Ira Hand.

National Association of Masters, Mates and Pilots. National Secretary—M. D. Tenniswood, 308 Vine St., Camden, N. J.

National Marine Engineers' Beneficial Association. Headquarters 311-315 Machinists Building, Washington D. C. President—Wm. F. Yates. Secretary—Albert L. Jones.

Neptune Association. 21 Pearl St., New York City. Secretary-Treasurer—Captain John F. Milliken.

New York and New Jersey Dry Dock Association, 111 Broadway, New York. President—Jonathan Moore.

Ocean Association of Marine Engineers. 15 Whitehall St., New York. Secretary—Bert L. Todd.

Port of New York Authority. 75 West Street, New York. Chairman—George S. Silzer. Secretary—Wilson J. Vance.

Society of Naval Architects and Marine Engineers. 29 West 39th Street, New York. Secretary and Treasurer—Daniel H. Cox.

The Maritime Association of the Port of New York. 78 Broad St., New York City. President—John Dowd. Secretary—John F. Manning.

The New York Tow Boat Exchange. 11 Moore St., New York. Manager—Langdon W. Smith.

The Propeller Club of the Port of New York. President—Harry W. Parsons, 111 Broadway, New York. Secretary—W. Z. Gardner, 136 Liberty Street, New York.

United States Naval Institute. Naval Academy, Annapolis, Md. Secretary and Treasurer—Captain H. A. Baldridge, U. S. N.

United States Ship Operators' Association. 149 Broadway, New York. President—Winchester Noyes.

Canada

Grand Council N. A. of M. E. of Canada. Grand Secretary-Treasurer—W. A. MacDonald, 62 Albert St., Halifax, N. S.

Great Britain

Institute of Marine Engineers, Incorporated. 85/88 The Minories, London, E.1.

Institution of Engineers and Shipbuilders in Scotland. 39 Elmbank Crescent, Glasgow.

Institution of Naval Architects. 5 Adelphi Terrace, London, W. C.

North East Coast Institution of Engineers and Shipbuilders. Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

France

Association Technique Maritime et Aéronautique. Secrétariat Genéral—7, rue de Madrid, Paris (8e).

Italy

Collegio Degli Ingegneri Naval e Meccanici in Italia.

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